Controllers

# CONTROLLERS

## Robot positioner

TS-S

TS-P

TS-X

## Robot driver

RDP

RDX

## Robot controllers

1axis

ERCD

ERCX

SR1-X

SR1-P

2 axes

RCX221

RCX222

DRCX

3/ 4 axes

RCX240

5 to 8 axes

YC-LINK couples single-axis controllers to a 4-axis controller

# This is why the YAMAHA controllers is terrific!

## 1 Simple and optimal setups

### Setting the parameters is simple

Robot controllers are designed in-house for YAMAHA robots. Optimal values for servo parameters required for operating the robot such as gain are stored beforehand in the robot. This task is easy and does not require special knowledge or experience or difficult setups.

### Setting acceleration/deceleration is easy

The acceleration/deceleration is a critical factor in determining the machine service life. **Setting the acceleration too high will shorten the machine service life, while setting it too low will prevent effective use of motor power and lower the tact time**. The acceleration/deceleration on YAMAHA robot controllers is determined to a fine degree for each model by the payload. Just entering the payload parameter will automatically set an optimal acceleration/deceleration that takes into account the robot service life and motor performance. Detailed robot knowledge from YAMAHA is what makes this possible. Moreover, SCARA robots are also equipped with zone control function that constantly delivers maximum performance that takes into account fluctuations in inertia due to the state of the arm (folded/extended).

(Note. On pulse train input types the acceleration/deceleration must be set by the customer )

## 2 Diverse command methods

YAMAHA controllers allow the user to select from an ample array of control methods including programming, point trace and pulse train to match the customer's application.

### ●Program entry

**YAMAHA SRC language** <examples>

```
MOVA 1, 100 ..... Move to point No. 1 at 100% of speed.
DO 1, 1 ..... Turn general purpose output No. 1 to ON.
WAIT 2, 1 ..... Wait until general purpose input No. 2 turns ON.
```

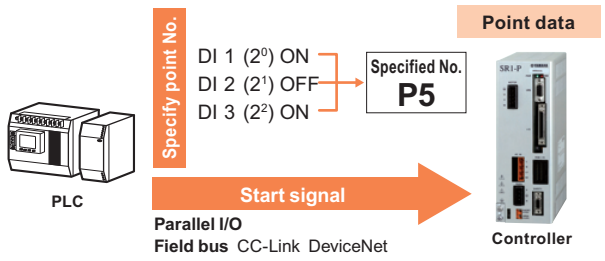
**YAMAHA BASIC language** <examples>

```
IF DO(10)=1 THEN *END ..... Jump to *END if general purpose input No. 10 is ON. If not ON, then proceed to next line.
MOVE P, P2, STOPON DI(1) =1 ..... Move to point No. 2. Stop if general purpose input No. 1 is ON during movement.
WAIT ARM ..... Wait until robot arm operation ends.
P3=WHERE ..... Write the current position in point No. 3.
*END : ..... Define the label with the "END" name.
HOLD ..... Pause the program.
```

Single axis robot controllers use the YAMAHA SRC language Note which is simple yet contains all required functions such as I/O outputs and conditional branching, etc. The multi axis controller RCX series uses the YAMAHA BASIC language capable of more sophisticated programs and includes all types of arithmetic computations, flexible setting of variables and various conditional branching, etc. Both are easy to use robot language conforming to BASIC. These match all manner of needs from simple beginning operations to sophisticated expert user tasks.

Note. The 2-axis controller DRCX also uses YAMAHA SRC language.

### ●I/O point trace



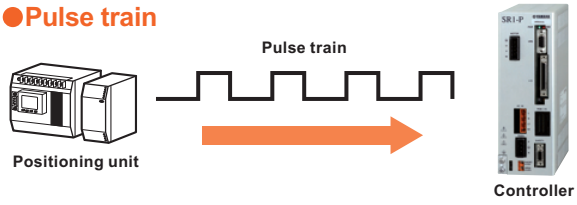

The host device specified a point No. in binary and the robot moves to that point No. when a start signal is input. The controller can operate just by teaching the point data and does not need a program.

### ●Remote command

This uses CC Link or DeviceNet word functions to issue various data or commands to the robot. It makes full use of word function expandability ranging from simple operation instructions to writing of point data and other sophisticated instructions and allows fully and flexibly using robot controller functions from a host device.

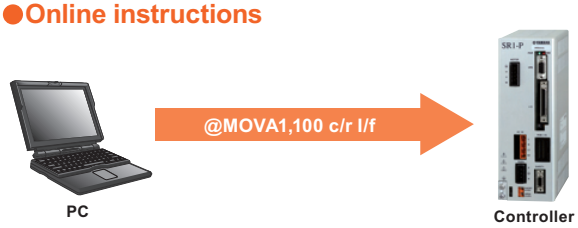
Note. These functions are operable when selecting the option network board.

### ●Pulse train




A pulse train sent from the positioning unit controls the robot. The controller does not have to handle programs or point data.
This control method is convenient when one wants to concentrate control in a host or upstream device.

### ●Online instructions




A PC connected via RS232C or Ethernet Note can be used to issue various commands and data directly to the robot controller or receive data and status. All operations performed from a teaching pendant can be executed from a PC.

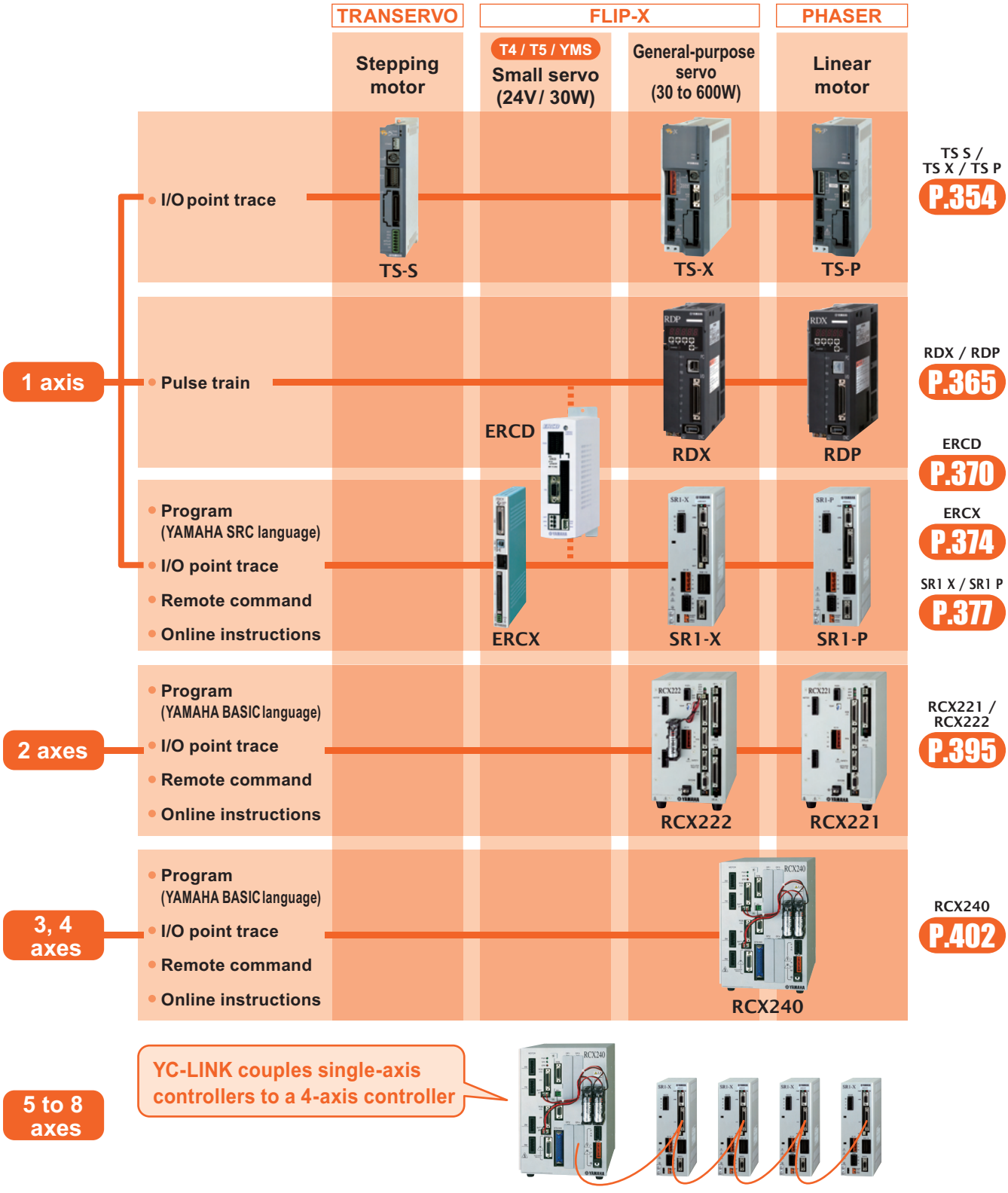
Note. Ethernet is operable by selecting the option network board.

## 3 Multi-functions and expandability

- Multi-axis controllers support up to 10,000 points, and single-axis controllers up to 1,000 points (255 points on the TS series). Up to 100 programs can be made on either type controller.
- Supports various field networks including CC-Link, DeviceNet, Profibus, Ethernet Note.
  Note. Some models do not support all networks.
- The TS series, RD series, SR1 series, and RCX series utilize a dual power supply system where the control power supply and (main) power supply are separate.
- Controllers support CE markings for EU (European) safety standards and so can also be used with confidence overseas. The TS series (except for TS-S), SR1 series, and RCX series can support safety category 4.

**To view detailed information on each controller's functions see the controller specification pages from P.349.**

# Control method classification table



## TS-X / TS-P P.354 FLIP-X PHASER | TS-S P.354 TRANSERVO

TS-X TS-P

Operation method: Point trace
Points: 255 points
Input power: AC100V / AC200V
Position detection:
TS-X Absolute
Incremental
TS-P Incremental
Semi-absolute

TS-S

Operation method: Point trace
Points: 255 points
Input power: DC24V
Position detection : Incremental

### 1. Simple operation only by specifying point number data

The TS series are robot positioners that operate just by specifying a point No. and entering a START signal. These can do positioning or push operations without having to write a program. Speed changes can be made during movement by carrying out linked operation.

### 2. Low price

Costs were drastically cut compared to prior robot controllers by limiting the point trace func ions and meticulously reviewing the circuit design. These helped achieve a price approximately 50% lower than the SR-1 series.

### 3. Completely applicable to absolute system

TS-X is completely applicable to the absolute system. No origin return operation is needed.Additionally, the backup battery is stored into the main unit. This tidies the inside of the electric component box. The backup battery can be replaced only by opening the front cover of the main unit. (Backup period is 1 year.)

### 4. Two pushing operation patterns

Two pushing operation patterns are incorporated. In addition to a normal mode, in which the pushing operation is performed at a low speed with a set pressing load, a “pushing after deceleration” mode is incorporated, in which the pushing operation is started after the robot has moved to a portion close to the target position and decelerated properly.

### 5. Maximum acceleration auto setting

The acceleration is a critical parameter that determines how long the robot can continue operating (or service life). The maximum acceleration is automatically set by taking the service life by model or transfer weight into consideration. In the custom setting of the TS series, acceleration or speed can be input in the SI unit system. At this time, the upper limit value is automatically set. This eliminates any worry about setting the acceleration too high by mistake.

### 6. Free speed change even during movement

Incorporating of a merge operation function makes it possible to easily change the speed parameters (acceleration and/or deceleration) even during movement.Additionally, when multiple points are merged and the same speed is set for each point, the signal can be output to the host controller every time the robot passes through each point.

### 7. Powerful support software: TS-Manager

The low-cost and high-performance TS-Manager was newly developed for the TS series. This single software performs all operations such as point data settings, editing, backup and teaching tasks. It also comes loaded with real-time trace functions such as current values, speed, load factors, current values, and voltage values.

### 8. LCD monitor showing easy-to-understand operation status display

On the TS-X/P, an LCD monitor integrated into the unit is available as option. It allows finding values such as the operation status, current position, speed and load factor at a glance.

## RDX / RDP P.365 FLIP-X PHASER

RDX

RDP

Operation method: Pulse string
Input power:
Main power 3-phase AC200V
Control power Single phase AC200V
Position detection:
RDX Absolute
Incremental
RDP Incremental

### 1. Special pulse string control driver

These are dedicated pulse train input robot drivers for the YAMAHA single-axis robot FLIP-X series and the PHASER series. Using dedicated pulse train control allows eliminating operation via robot language so this can be easily assembled into automated units as a control device for compact and low-priced robot mechanisms.

### 2. Low price

By rationalizing functions and using the structure with reduction of parts and ease of assembly taken into consideration, the cost is reduced by 35% as compared with YAMAHA’s conventional product.

### 3. Easy tuning

YAMAHA offers optimal parameters for each particular robot model. This completely eliminates having to make bothersome servo positioning such as needed when building up systems that use general-purpose servo drivers. Due to the unique features of pulse train input, the acceleration/deceleration settings are entrusted to the customer however YAMAHA supplies material with each machine model for use as a general guide when making acceleration settings.

### 4. Origin return function

As a special origin return input function is provided, returning to the origin is executed automatically without making a complicated sequence. (Customer can also enter a sequence.)

### 5. Analog output function

Analog monitor output terminals for 2 channels are provided.
This function can be used to select parameters for speed detection values, torque command values, speed command values, speed deviation, position deviation, electrical current values, command pulse frequency, and the regenerative braking usage rate.

### 6. Compact

Compact design of H160 × W57 × D130mm. The size reduction to 65% of the YAMAHA’s conventional product in volume has as been achieved. It saves space in the control panel.

### 7. Easy operation environment

Use of the special PC software “TOP” enables pleasant and easy operation by means of GUI.

<Single-axis robot controllers>

## SR1-X / SR1-P P.377

FLIP-X PHASER

SR1-P

SR1-X

Operation method: Program
Point trace
Remote command
Online command
Points: 1000 points
Input power: AC100V / AC200V
Position detection:
SR1-X Absolute / Incremental
SR1-P Incremental / Semi-absolute

### 1. Diverse command methods

Select an optimal method from the different command methods including program operation, point trace, remote command, and on-line command. Program uses the YAMAHA SRC language resembling BASIC. Use it to execute a variety of operations ranging from simple tasks to I/O output and conditional branching, etc.

### 2. I/O assignment function

Besides the usual program operation, changing the I/O assignment allows selecting operations such as point trace, point teaching, and trace operation by specifying coordinates. In point teaching mode Jog can be performed via the I/O so a host device can perform point teaching even without an HPB.

### 3. Supports complete absolute specifications

The SR1-X supports complete absolute specifications. No origin point return is needed (backup period with no power supplied is 1 year).

### 4. Current position output function

These controllers can output the position data as feedback pulses or binary data. This allows the host device to find the current robot position in real-time. These are also loaded with functions such as point zone output that outputs the zone or a point No. in its vicinity.

### 5. Torque limiter

This function limits the maximum torque command value to an optional timing and so is effective in operations such as grip and press-fit. Besides using parameter data values for torque limiting, analog input voltages can also be used to limit the torque.

<Single-axis robot controllers>

## ERCD P.370

T4/T5 YMS

ERCD

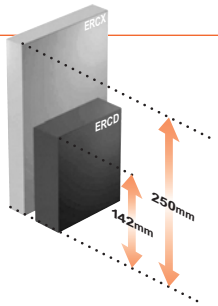
Operation method: Program
Point trace
Remote command
Online command
Pulse string
Points: 1000 points
Input power: DC24V
Position detection: Incremental

### 1. 5 command formats

Select from 5 command formats including program operation that allows using diverse commands, or point trace operation that works just by specifying a point No., or remote commands, on-line commands, and pulse train input.

### 2. Compact design

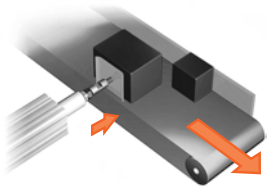
Along with sophisticated functions, the ERCD also has a compact box shape of W44 × H142 × D117. It is compact, only taking up about 62% of the area used by the prior YAMAHA ERCX model. This allows greater freedom for use of installation space.




### 3. Diverse input/output functions

The ERCD includes a feedback pulse output function that allows easily controlling the current position from a host control device. Moreover, movement point numbers can be easily output in binary during point trace so operation points are easy to check. Teaching functions can also be added by way of I/O, and there is more freedom in building up the system and it is easier to use. This output is also effective for program and point trace operation, and the number of outputs can be changed as needed by a divider setting.

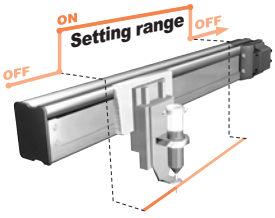
### 4. Torque restriction control



As the torque restriction can be controlled using the program command, the axis can be stopped with the torque applied. This function is usable for continuous positioning of works of different sizes, press-fitting work and work retaining operation.

### 5. Zone output function

It is possible to set ON / OFF of the general purpose output between any points by using the parameter setting. Also, the axis position can be judged easily by using an external equipment as positive logic / negative logic settings can be made. Settings are acceptable up to 4 patterns.

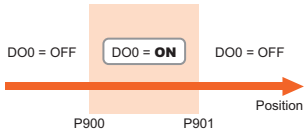


## SR1-X / SR1-P / ERCD Diverse functions

### 1. Position data output function

**Zone output**

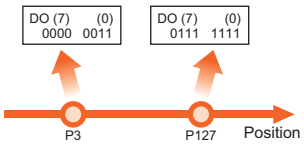
Outputs whether the robot position is within the specified range or not.




**It is possible to reverse the output logic.**

**Point zone output**

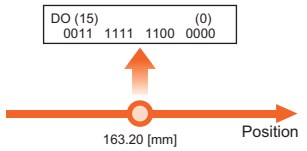
Outputs the number of the point near the robot position in the binary output.




**It is also possible to limit to the moving point only.**

**Binary output**

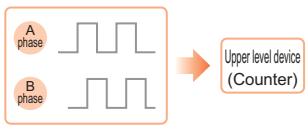
Outputs current robot position by 16bits binary.
(This function is only available on the SR1)




**It is possible to adjust the unit of the output position data by using parameters.**

**Feedback pulse output**

Outputs the current position counter value of the robot through the A/B phase line driver.

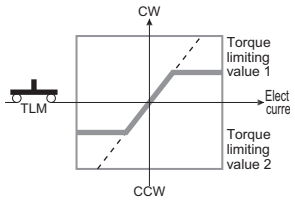



**It is possible to monitor at real time by using the upper level device. A division function is installed.**

### 2. Torque limiting drive

It is possible to perform such actions as pressing and gripping the work by restricting the torque during operation.

**General idea**




**Features**

SR1

- Control over limit timing at the upper level by TLM input.
- Grasp of limit condition by torque limit condition output (TLON).
- Selection of torque limit value by input (up to 4 patterns).
- Allows torque limiting with the program command.
- Limit of the torque by analog input (0 to +10V/12bit).

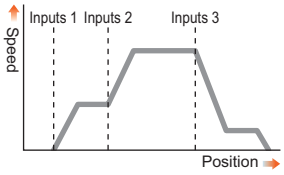
ERCD

- Limits the torque by using the T program command.

### 3. Changing movement data function

Possible to change the moving speed and programmed position while moving. (This function is SR1 only )

**General idea**




**Features**

- Control over movement change timing at the upper level by movement command input.
- The movement command is either ABS-PT (absolute movement command) or ABS-BN (Binary specification movement command).
- Selection of speed specification is 1 to 100% (up to 4 patterns).
- Change in the deceleration range is invalid.

### 4. Point instruction

It is possible to execute jog movement of the robot and point teaching from the upper level device.

**General idea**

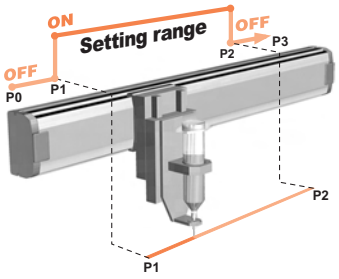
- Robot is moved to the position where teaching is to be done by the JOG+/JOG-command.

- The current position is registered to the number of the point specified by PSET input.

## Handy YAMAHA SRC language functions

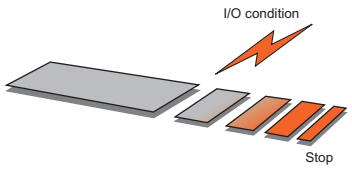
### 1. Multitask function

This function enables to execute up to 4 tasks of peripheral equipment of the robot at the same time. With the multitask function combined with the JMPP command, it is possible to have I/O output when the specified point is passed during movement.




### 2. Function to make conditional stop during movement

The arm can be decelerated and stopped, using I/O conditions of the MOVF command while it is moving. This function is useful when searching the target position with a sensor.



<Single-axis robot controllers>

## ERCX P.374

T4 / T5 YMS

ERCX

Operation method: Program
Point trace
Remote command
Online command
Pulse string
Points: 1000 points
Input power: DC24V
Position detection: Absolute
Incremental

### 1. Diverse command methods

Select an optimal method from the different command methods including program operation, point trace, remote command, and on-line command. Program uses the YAMAHA SRC language resembling Basic. Use it to execute a variety of operations ranging from simple tasks to I/O output and conditional branching, etc.

### 2. Totally absolute

Resolvers serve as the absolute position detectors. The ERCX includes a backup function for multi-rotation data, achieving total absolute specifications (backup period is a maximum of about 2 weeks).

### 3. Ultra-thin type

Using a 1 board design attained ultra-thin dimensions of 30mm. The height and depth dimensions are the same as the SRCX/DRCX and it easily fits within a control panel.

### 4. Ample data capacity

A maximum of 1,000 points, and maximum of 100 programs can be set. Contains general input/output points to a maximum of 16/13 points.

<MF100 dedicated controller>

## SRCP30 P.383

Dedicated MF100

SRCP30

Operation method : Program
Point trace
Remote command
Online command
Pulse string
Points : 1000 points
Input power :
Main power 3-phase AC200V
Control power Single phase AC200V
Position detection : Incremental

**This is a large capacity controller exclusively for the MF100 large size linear single axis robot having a payload of 100kg.**

### 1. 5 command formats

Select from 5 command formats including program operation that allows using diverse commands, or point trace operation that works just by specifying a point No., or remote commands, on-line commands, and pulse train input.

<2 axes robot controllers>

## DRCX P.387

XY-X FLIP-X YP-X

DRCX

Operation method: Program
Point trace
Remote command
Online command
Points: 1000 points
Input power: AC100V / AC200V
Position detection: Absolute
Incremental

### 1. Diverse command methods

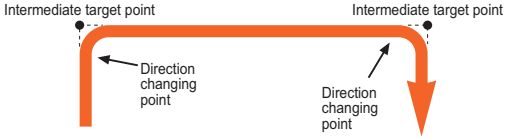
Select an optimal method from the different command methods including program operation, point trace, remote command, and on-line command. Program uses the YAMAHA SRC language resembling BASIC. Use it to execute a variety of operations ranging from simple tasks to I/O output and conditional branching, etc.

### 2. Completely absolute

Compatible with absolute position detector resolvers. A function to backup the multi-rotation amount data is provided thereby realizing a completely absolute model. (Back up period is a maximum of about 2weeks.)

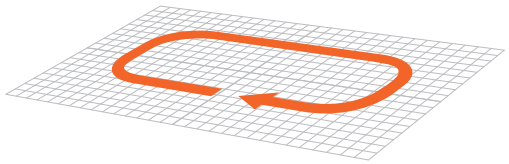
### 3. Arch motion function

This function enables movement with the direction changed before reaching the intermediate target position so that the pick & place operation in air is executed quickly. The direction changing point can be set freely by using a parameter.



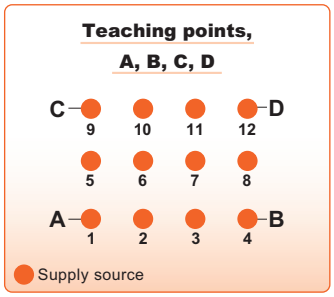

### 4. Two-dimensional linear and circular interpolation control function

Capable of controlling two-dimensional linear and circular interpolation ARC (XY plane).



### 5. Palletizing function

Only by inputting 4 corner positions on the pallet as teaching points, it is possible to define up to 32 types of pallets easily. For palletizing operation, specify the defined pallet No. and execute the matrix movement command.

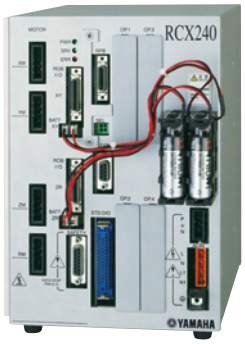


<Multi-axis controller>

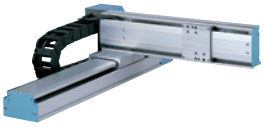
# RCX240

**The YAMAHA controller RCX240 is usable on all models (except some small single-axis robots).**

## [Typical robot configurations]




- 2 axes robot + Single-axis robot (FLIP-X series)



- 2 axes robot + 2 axes robot

- 3 axes robot + Single-axis robot (PHASER series)

- SCARA robot

## The RCX240 supports all YAMAHA robot models

The 4-axis robot controller RCX240 supports all robot models including single-axis, Cartesian, SCARA, and Pick & Place. It can also control a mix of models including the FLIP-X ball screw type and PHASER linear motor type which allows a high degree of freedom when assembling systems to match your application.
This 1 unit is all you need to service multiple robot units. By just changing its settings you can operate any model.

<Multi-axis controller>

# RCX series (RCX221 / 222) P.395 (RCX240) P.402 Supports all models

RCX221

Operation method:
Program
Operation via communication commands
Points: 1000 points
Input power: AC200V
Position detection: Incremental
Semi-absolute

RCX222

Operation method:
Program
Operation via communication commands
Points: 1000 points
Input power: AC200V
Position detection: Absolute
Incremental

RCX240

Operation method:
Program
Operation via communication commands
Points: 1000 points
Input power: AC200V
Position detection: Absolute
Incremental

## 1. Supports all YAMAHA robot models

The RCX series supports all YAMAHA robot models such as the PHASER, FLIP-X and XY-X. It makes most types of applications possible since single-axis (FLIP-X/PHASER) and Cartesian robot can be used in any desired combination (not including some small single-axis robots).

## 2. Complete absolute specs

The RCX uses complete absolute specifications so of course no origin return is needed when the power is turned on. It also supports incremental specifications on a completely identical system (The PHASER series utilizes a magnetic scale and supports semi-absolute or incremental specifications.)

## 3. Big boost absolute data backup time

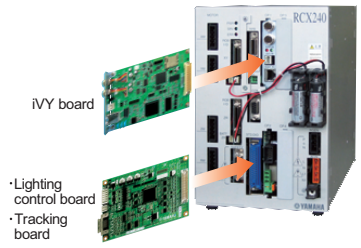
Making an energy-saving backup circuit has drastically extended the retention time for absolute position data with no power applied. Ordinary model backup time was a maximum of 1 month has now been boosted to 1 year. Current position information can now be monitored during long vacations, equipment storage, or even during transport, and origin return is not needed when power is restored. This allows quick and easy production startups.

## 4. Area check output function

This function provides an output signal when the robot enters a preset area. Up to four areas can be specified.

## 5. Supports the robot vision "iVY System"

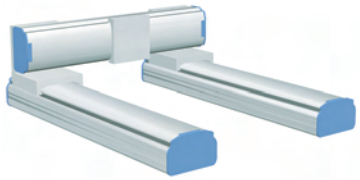
The RCX series also supports the YAMAHA robot vision "iVY System" capable of handling a vast range of applications yet is simple to setup. Installing the vision board inside the controller unit drastically simplifies the calibration task that up to now took a lot of time and trouble. Performing position offset at image recognition widens the device sphere of applications and makes it usable for general-purpose tasks (only supported on RCX240).




## 6. Dual-synchronous drive

Equipped with the dual drive function to control 2 axis in synchronization, which is of effective use for carrying heavy items and long stroke operation with the Cartesian robot. This function enables good use of high speed, acceleration/deceleration features of the YAMAHA robots.
(Note. For the dual drive function, custom order arrangement is required. For more information, contact YAMAHA.)

◆ Dual-synchronous drive example.

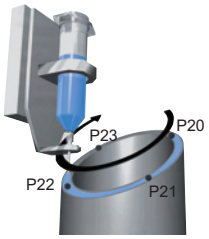


## 7. Double-carrier anti-collision control function

Collisions between carriers when using double-carriages can be prevented by a control function within the controller. Former collision prevention measures such as zone judgments or external sensors are no longer needed so double-carriers are now easier to use than ever before.

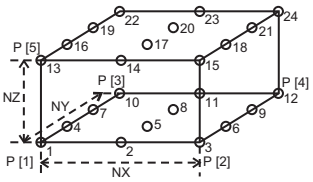
## 8. 3D circular interpolation control

2D and 3D linear and circular interpolation ARC control are possible, making the RCX141 controller ideal for sealing work, etc. (3-dimensional interpolation is only available on the RCX240)



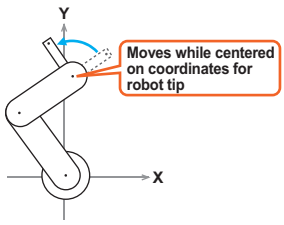

## 9. Palletizing function

This function can easily define a maximum of 20 types of pallets by just entering the teaching points for the 4 corner positions on the pallet. Entering teaching points along the height allows handling cubic pallets. Specify the defined pallet No. and execute the movement command to perform palletizing. The program can execute various actions such as 1 point → pallet, pallet → 1 point, pallet → pallet, etc.

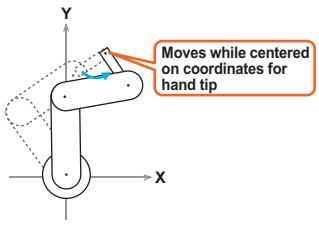



## 10. Hand definition

This function operates the robot based on coordinates when the tool tip has been installed in the tip of the robot shaft in an offset position. This is especially effective during tool rotation on SCARA robots and robots with rotating shafts.



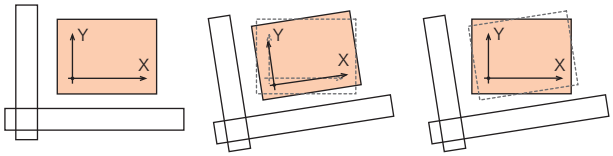

No hand definition




Hand definition

## 11. Shift coordinates

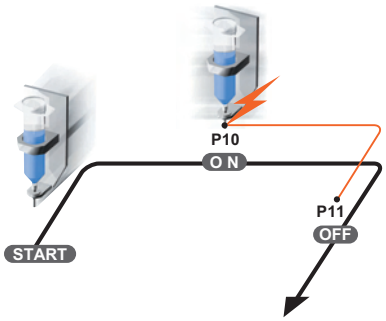
A deviation or offset might occur in the coordinates during service tasks such as robot reinstallation or replacement. In those cases using the coordinates can be corrected by using the shift coordinate function so point data can be utilized without having to make changes and there is no need for reteaching.




Original coordinates | Coordinates after reinstalling | Correction with shift coordinates

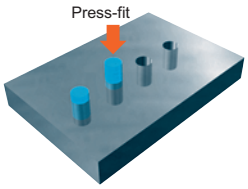
## 12. Passing point output control

This function can turn general outputs ON or OFF at specified points so operation can continue with no stops along an axis during interpolation tasks.
This outputs a spray ON or OFF signal while still operating on an axis during sealing to allow stable and smooth coating of sealant.




## 13. Torque limiting drive

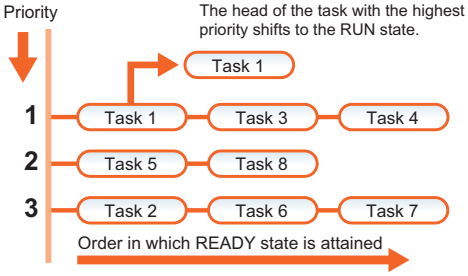
The motor torque can be limited during grasping and press-fitting operations.




## 14. Multitask function

This function executes multiple tasks (up to eight tasks) Multiple tasks will switch with the timesharing method. However, a priority can be assigned to each task. This priority can also be changed while tasks are running. The multitask function simplifies the entire system's control configuration and also improves the operation efficiency.

◆ **Task scheduling**

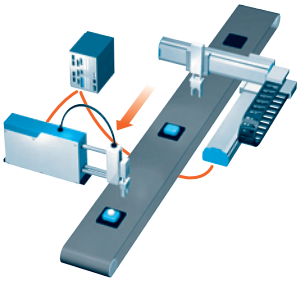



## 15. Sequence program

In addition to the standard tasks, a task to control input/output (parallel, serial, memory, timer) can be executed independently.
As the sequence program is effective in the manual mode as well, it is usable to construct the safety system linked with the peripheral equipment.

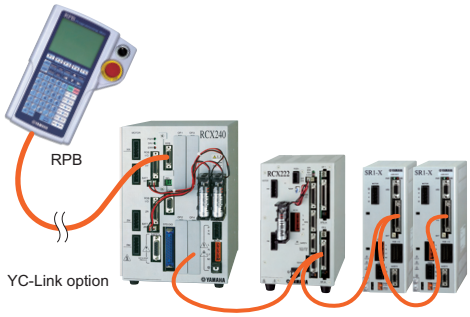
## 16. 2-robot control

Assigning 2 robot units as main and sub allows them to be simultaneously operated by 1 controller unit. Combining this with multi-tasking allows 1 controller unit to link 2 robot units in a smooth, sophisticated operation.



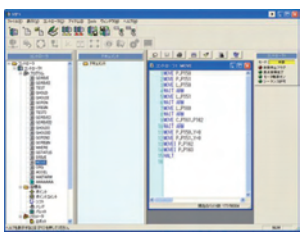
## 17. Additional axis function "YC-Link"

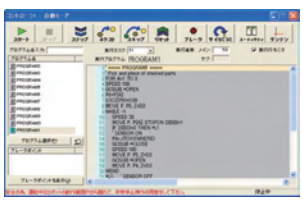
Using an optional YC-Link, the RCX series controller and SR1 series single axis controller can be linked easily. If necessary, by linking some controllers, it is possible to control up to 8 axes (Max. 6 axes for simultaneous control).

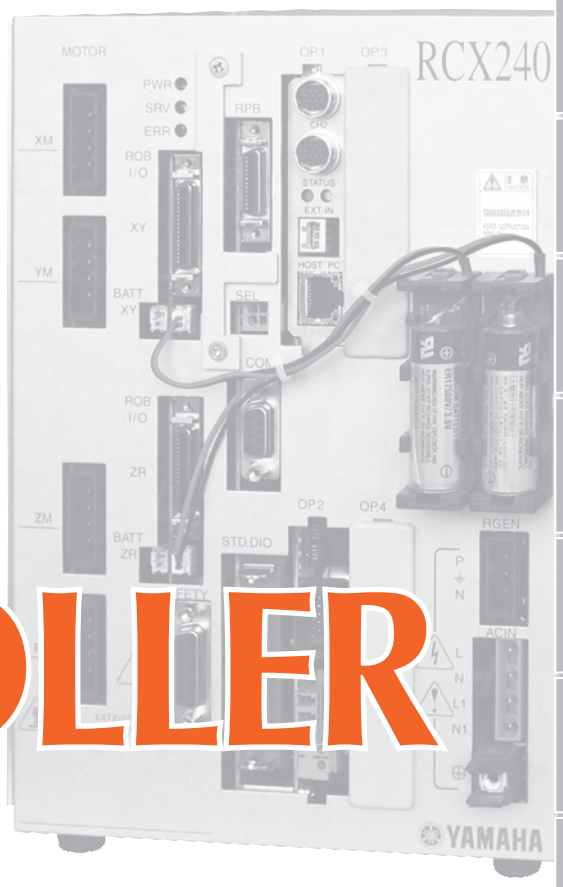



## 18. Full support software: VIP+

VIP+ is an easy to operate application software that makes it easy to visually understand tasks including robot operation, program writing and edit, and point teaching.
The user interface has been vastly improved compared to previous support software VIP and is now extremely easy to use.







YAMAHA ROBOT CONTROLLERS

# CONTROLLER

## CONTENTS


**POSITIONER**

TS-S/TS-X/TS-P ····· 354
- Support software for PC TS-Manager ····· 362
- Handy terminal HT1/HT1-D ····· 363
- Field network system with minimal wiring NETWORK ····· 364

**DRIVER**

RDX/RDP ····· 365
- Support software for PC TOP ····· 369

**CONTROLLER**

ERCD ····· 370
ERCX ····· 374
SR1-X/SR1-P ····· 377
SRCP30 ····· 383
DRCX ····· 387
- Support software for PC POPCOM ····· 391
- Programming box HPB/HPB-D ····· 393
- Field network system with minimal wiring NETWORK ····· 394

RCX221/RCX222 ····· 395
RCX240 ····· 402
- Support software for PC VIP+ ····· 410
- Programming box RPB/RPB-E ····· 413
- Field network system with minimal wiring NETWORK ····· 414

**ROBOT VISION iVY SYSTEM**

iVY System ····· 415




Main functions ▶ P.030

# CONTROLLER FEATURE DESCRIPTION

## Single-axis

### TS-S

**Robot positioner**

- **Dedicated compact single-axis TRANSERVO**

P.354

| | |
|---|---|
| Operating method | : I/O point tracing |
| Points | : 255 points |
| Input power | : DC24V |
| Position detection method | : Incremental |
| Field networks | : CC-Link, DeviceNet |

### TS-X / TS-P

**Robot positioner**

- **Single-axis robot FLIP-X**
- **Linear motor single-axis PHASER**

P.354

| | |
|---|---|
| Operating method | : I/O point tracing |
| Points | : 255 points |
| Input power | : AC100V / AC200V |
| Position detection method | : |
| • TS-X | Absolute / Incremental |
| • TS-P | Incremental / Semi-absolute |
| Field networks | : CC-Link, DeviceNet |

### RDX / RDP

**Robot driver**

- **Only for pulse train control**

P.365

| | |
|---|---|
| Operating method | : Pulse train control |
| Input power | : |
| • Main power supply | 3-phase AC200V |
| • Control power supply | single phase AC200V |
| Position detection method | : Incremental |
| Field networks | : Not supported |

## Single-axis

### SR1-X / SR1-P

**Robot controller**

- **Single-axis robot FLIP-X**
- **Linear motor single-axis PHASER**

P.377

| | |
|---|---|
| Operating method | : Programming / I/O point tracing / Remote command / Operation using RS-232C communication |
| Points | : 1000 points |
| Input power | : AC100V / AC200V |
| Position detection method | : SR1-X Absolute / Incremental<br>SR1-P Incremental / Semi-absolute |
| Field networks | : CC-Link, DeviceNet, Profibus |

## 1 to 2 axis

### DRCX

**Robot controller**

- **Single-axis robot FLIP-X**
- **Cartesian robot XY-X**
- **Pick & place YP-X**

P.387

| | |
|---|---|
| Operating me hod | : Programming / I/O point tracing / Remote command / Operation using RS-232C communica ion |
| Points | : 1000 points |
| Input power | : AC100V / AC200V |
| Position detection method | : Absolute / Incremental |
| Field networks | : CC-Link, DeviceNet, Profibus, Ethernet |

## ERCD

### Robot controller

- **Single-axis robot T4 / T5**
- **Clean single-axis C4 / C5**
- **Rod type YMS**

P.370

Operating method : Pulse train control / Programming / I/O point tracing / Remote command / Operation using RS-232C communication
Points : 1000 points
Input power : DC24V
Position detection method : Incremental
Field networks : Not supported

## ERCX

### Robot controller

- **Single-axis robot T4 / T5**
- **Clean single-axis C4 / C5**
- **Rod type YMS**

P.374

Operating method : Programming / I/O point tracing / Remote command / Operation using RS-232C communica ion
Points : 1000 points
Input power : DC24V
Position detection method : Absolute / Incremental
Field networks : CC-Link, DeviceNet, Profibus, Ethernet

## SRCP30

### Robot controller

- **Dedicated Linear motor single-axis MF100**

P.383

Operating method : Pulse train control / Programming / I/O point tracing / Remote command / Operation using RS-232C communication
Points : 1000 points
Input power :
• Main power supply 3-phase AC200V
• Control power supply single phase AC200V
Position detection method : Incremental
Field networks : CC-Link, DeviceNet Profibus, Ethernet

## 1 to 4 axis

## RCX221 / RCX221HP

### Robot controller with advanced functions

- **Single-axis robot FLIP-X**
- **Linear motor single-axis PHASER**
- **Cartesian robot XY-X**
- **Pick & place YP-X**

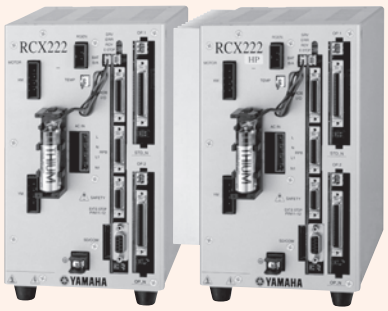
P.395

Operating method : Programming / I/O point tracing / Remote command / Operation using RS-232C communication
Points : 10000 points
Input power : AC200V
Position detection method : Incremental / Semi-absolute
Field networks : CC-Link, DeviceNet, Profibus, Ethernet

## RCX222 / RCX222HP

### Robot controller with advanced functions

- **Single-axis robot FLIP-X**
- **Cartesian robot XY-X**
- **Pick & place YP-X**



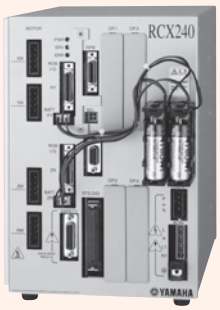

P.395

Operating method : Programming / I/O point tracing / Remote command / Operation using RS-232C communication
Points : 10000 points
Input power : AC200V
Position detection method : Absolute / Incremental
Field networks : CC-Link, DeviceNet, Profibus, Ethernet

## RCX240

### Robot controller with advanced functions

- **Single-axis robot FLIP-X**
- **Linear motor single-axis PHASER**
- **Cartesian robot XY-X**
- **SCARA robot YK-XG**
- **Pick & place YP-X**




P.402

Operating method : Programming / I/O point tracing / Remote command / Operation using RS-232C communication
Points : 10000 points
Input power : AC200V
Position detection method : Absolute / Incremental / Semi-absolute
Field networks : CC-Link, DeviceNet, Profibus, Ethernet

# CONTROLLER SPECIFICATION SHEET

| Category | | | | Robot positioner | | | Robot driver | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Name | | | | TS-S | TS-X | TS-P | RDX | RDP | ERCD | |
| External view | | | | | | | | | | |
| Operating method | | | | I/O point tracing | | | Pulse train control | | Pulse train control / Programming / I/O point tracing / Remote command / Operation using RS-232C communication | |
| Input power | | | | DC24V +/-10% maximum | ● **Main power supply / Control power supply** Single phase 200 to 230V +/-10% maximum (50/60Hz) | | ● **Main power supply** 3-phase 200 to 230V +10% to -15% (50/60Hz+/-5%) ● **Control power supply** Single phase 200 to 230V +10% to -15% (50/60Hz+/-5%) | | DC24V +/-10% maximum | |
| Number of controllable axes | | | | Single-axis | | | Single-axis | | Single-axis | |
| Applicable robot | New concept compact stepping single-axis motor | TRANSERVO | | ● | – | – | – | | – | |
| | Single-axis robot | FLIP-X | T4 / T5 / C4 / C5 / YMS | – | – | – | – | | ● | |
| | | | FLIP-X other than above | – | ● | – | ● | | – | |
| | Linear motor Single-axis robot | PHASER | PHASER other than MF100 | – | – | ● | ● | | – | |
| | | | MF100 | – | – | – | – | | – | |
| | Cartesian robot | XY-X | | – | – | – | – | | – | |
| | SCARA robot | YK-X | | – | – | – | – | | – | |
| | Pick & place robot | YP-X | | – | – | – | – | | – | |
| Position detection method | | | | Incremental | Absolute / Incremental | Incremental / Semi-absolute | Incremental | | Incremental | |
| Maximum number of programs | | | | (program not required) | | | – | | 100 | |
| Maximum number of steps per program | | | | (program not required) | | | – | | 1024 steps | |
| Points | | | | 255 points | | | – | | 1000 points | |
| Multitasks | | | | – | – | – | – | | 4 | |
| I/O points | | Dedicated I/O | | 16 points | 16 points | 16 points | – | | 8 points / 3 points | |
| | | General I/O | | – | – | – | – | | 6 points / 6 points | |
| Programming box | | | | HT1 / HT1-D (with enable switch) | | | – | | | |
| Support software for PC | | | | TS-Manager | | | TOP | | | |
| Detailed info page | | | | P.354 | | | P.365 | | P.370 | |

| Robot controller | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ERCX | SR1-X | SR1-P | SRCP30 | DRCX | RCX221<br>RCX221HP | RCX222<br>RCX222HP | RCX240 |
| | | | | | | | | |
| | Programming /<br>I/O point tracing /<br>Remote command /<br>Operation using RS-232C communication | Programming /<br>I/O point tracing /<br>Remote command /<br>Operation using RS-232C communication | | Pulse train control /<br>Programming /<br>I/O point tracing /<br>Remote command /<br>Operation using RS-232C communication | Program /<br>Point trace /<br>Remote command /<br>Operation using RS-232C communication | Programming /<br>I/O point tracing /<br>Remote command /<br>Operation using RS-232C communication | | |
| | DC24V<br>+/-10%<br>maximum | ● **Main power supply**<br>**05 / 10 driver**<br>Single phase 100 to 115V/200 to 230V +/-10% maximum (50/60Hz)<br>● **Control power supply**<br>**20 driver**<br>Single phase 200 to 230V +/-10% maximum (50/60Hz) | | ● **Main power supply**<br>3-phase 200 to 230V +/-10% maximum (50/60Hz)<br>● **Control power supply**<br>Single phase 200 to 230V +/-10% maximum (50/60Hz) | **0505 / 0510 / 0520 / 1005 / 1010 / 2005 driver**<br>Single phase 100 to 115V/200 to 230V +/-10% maximum (50/60Hz)<br>**1020 / 2010 / 2020 driver**<br>Single phase 200 to 230V +/-10% maximum (50/60Hz) | Single phase 200 to 230V+/-10% maximum (50/60Hz) | Single phase 200 to 230V+/-10% maximum (50/60Hz) | Single phase 200 to 230V+/-10% maximum (50/60Hz) |
| | Single-axis | Single-axis | | Single-axis | 2 axes maximum | 2 axes maximum | 2 axes maximum | 4 axes maximum |
| | – | – | – | – | – | – | – | – |
| | ● | – | – | – | – | – | – | – |
| | – | ● | – | – | ● | ● | ● | ● |
| | – | – | ● | – | – | ● | – | ● |
| | – | – | – | ● | – | – | – | – |
| | – | – | – | – | ● | ● | ● | ● |
| | – | – | – | – | – | – | – | ● |
| | – | – | – | – | ● | – | ● | ● |
| | Absolute /<br>Incremental | Absolute /<br>Incremental | Incremental /<br>Semi-absolute | Incremental | Absolute / Incremental | Incremental /<br>Semi-absolute | Absolute /<br>Incremental | Absolute /<br>Incremental /<br>Semi-absolute |
| | 100 | 100 | | 100 | 100 | 100 | 100 | 100 |
| | 3000 steps | 3000 steps | | 3000 steps | 3000 steps | 9999 steps | 9999 steps | 9999 steps |
| | 1000 points | 1000 points | | 1000 points | 1000 points | 10000 points | 10000 points | 10000 points |
| | 4 | 4 | | 4 | 4 | 8 | 8 | 8 |
| | 8 points / 3 points | 8 points / 4 points | | 8 points / 3 points | 8 points / 3 points | 10 points / 12 points | 10 points / 12 points | 10 points / 11 points |
| | 16 points / 13 points | 16 points / 16 points | | 8 points / 5 points | 16 points / 13 points | 16 points / 8 points | 16 points / 8 points | 16 points / 8 points |
| | HPB / HPB-D (with enable switch) | | | | | RPB / RPB-E (with enable switch) | | |
| | POPCOM | | | | | VIP+ / VIP | | |
| | P.374 | P.377 | | P.383 | P.387 | P.395 | | P.402 |

Single axis

# TS-S/TS-X/TS-P TS series

Robot positioner  Dedicated I/O point tracing

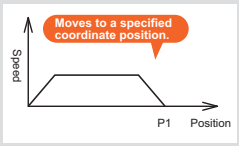
TS series are positioner type controllers that only performs point trace. No program is needed. Operation is simple. After setting point data, specify the point number and enter a START signal from host controller such as a PLC. Positioning or pushing operation then begins.

## Features

### 1 Main operation patterns

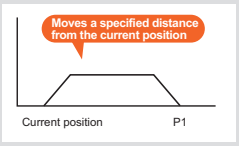
#### Normal operation

**ABS (absolute) operation**



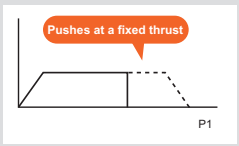

Moves to the target position relative to the origin point and completes positioning.

**INC (incremental) operation**



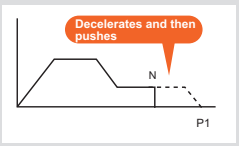

Moves from the current position just by a distance specified in point data and completes positioning.

**Pushing operation**




Moves while pushing at a preset push force.

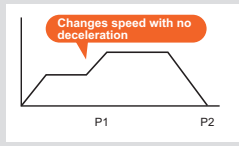
**Pushing after decelerating**




Pushing starts after decelerating at a distance equal to "Near width (N)" from the target position.

#### Merge operation

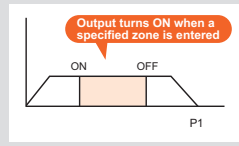
**Merge operation**




Moves to multiple points in succession. If different speeds were set, then the speeds are changed without decelerating and stopping to continue point-to-point operation.

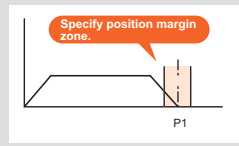
#### Output pattern

**Zone output**




Zone for external I/O output can be set for each point.

**"Near width" output**




"Near width" output zone can be set for each point as a position margin zone where "positioning complete" signal is to be output.

### 2 Detailed data can be set for each point

Settings such as acceleration, deceleration, zone output range, and position margin zone can be set for each point. Different operations can be easily specified by combining these settings with the above operation patterns.

#### Setting items

| Setting item | | Description |
|---|---|---|
| 1 | Run type | Specifies operation pattern such as ABS, INC, positioning, push, and point-to-point link. |
| 2 | Position | Specifies position or distance to move. |
| 3 | Speed | Specifies maximum speed during operation. |
| 4 | Accel. | Specifies acceleration during operation. |
| 5 | Decel. | Specifies deceleration during operation (Percentage of acceleration) |
| 6 | Push | Specifies motor current limitation during pushing operation. |
| 7 | Zone (-) | Specifies upper and lower limits of "personal zone" for each point data. |
| 8 | Zone (+) | |
| 9 | Near width | Specifies position margin zone where "near width" output should turn on. |
| 10 | Jump | Specifies next movement destination after positioning or linked des ination for point-to-point operation. |
| 11 | Flag | Specifies stop mode and others. |

Note:Acceleration and deceleration can be set in easy-to-understand percentage (%) units (standard setup) or in SI units (custom setup) which make it easy to calculate the cycle time.

### 3 Maximum acceleration auto setting

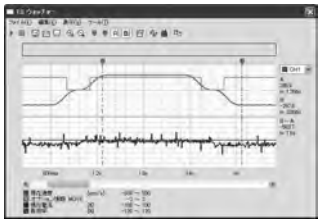
Acceleration is a critical parameter that determines how long the robot can continue operating (or service life). In worst cases, setting the acceleration too high may cause the robot to breakdown after a short time.
On the TS series, the maximum acceleration is finely set by taking into account the service life span of the motor output and the guide for each robot model and payload. This eliminates any worry about setting the acceleration too high by mistake.

### 4 Full range of monitor functions

The TS-Manager developed exclusively for the TS series not only does data write, edit, backup tasks and parameter settings but also comes loaded with cycle-time, simulator, and monitor functions of all types.
A run-distance monitor for maintenance use is provided as a standard unit feature. Design emphasizes easy, user-friendly operation.

**Main monitor displays**

- Position · Speed
- Current · Load factor
- Voltage · Temperature
- Input information
- Output information



P.362

### 5 LCD monitor showing easy-to-understand operation status display

TS-X TS-P

A main-unit integrated type LCD monitor is available as an optional unit.
The operation status, current position, load factor, and/or error contents can be understood at a glance.

## Model Overview

| Name | TS-S | TS-X | TS-P |
|---|---|---|---|
| Power | DC24V +/-10% | Single phase 200 to 230V +/-10% maximum (50/60Hz) | |
| Operating method | I/O point tracing | | |
| Maximum number of controllable axes | Single-axis | | |
| Position detection method | Incremental | Absolute / Incremental | Incremental / Semi-absolute |
| Controllable robot | Compact single-axis robot TRANSERVO | Single-axis robot FLIP-X | Linear motor single-axis robot PHASER |
| Support software for PC | TS-Manager | | |

## Ordering method

### TS-S

**TS-S** [ ]

| Controller | I/O |
|---|---|
| | NP: NPN |
| | PN: PNP |
| | CC: CC-LINK |
| | DN: DeviceNet |

### TS-X / TS-P

**TSX** [ ] – [ ] – [ ] – [ ] – [ ] – [ ]

| Controller | Driver: Power-supply voltage / Power capacity | Regenerative unit | LCD monitor | Usable for CE | Input/Output Selection | Battery Note1 |
|---|---|---|---|---|---|---|
| TSX: TS-X | 205: 200V / 100W more less | No entry: None | No entry: None | No entry: Standard | NP: NPN | B: With battery (Absolute model) |
| TSP: TS-P | 210: 200V / 200W | R: With RGT | L: With LCD | E: CE marking | PN: PNP | N: None (Incremental model) |
| | 220: 200V / 400 to 600W | | | | CC: CC-LINK | |
| | | | | | DN: DeviceNet | |

Note1. Battery can only be selected for TS-X. (Not provided for TS-P).

## TS-X / TS-P specification selection table

Some specifications are automatically determined by the robot model.

### TS-X

| | | | T4H / C4H | T5H / C5H | T6 / C6 | T9 | T9H | F8 / C8 | F8L / C8L | F8LH / C8LH | F10 / C10 | F14 / C14 | F14H / C14H | F17 / C17 | F17L / C17L | F20 / C20 | F20N | N15 / N15D | N18 / N18D | B10 | B14 | B14H | R5 | R10 | R20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Power supply voltage / Current sensor | TS-X | 205 | ● | ● | ● | ● | | ● | ● | ● | ● | ● | | | | | | | | ● | ● | ● | ● | ● | |
| | | 210 | | | | | ● | | | | | | ● | | | | | | | | | | | | ● |
| | | 220 | | | | | | | | | | | | ● | ● | ● | ● | ● | ● | | | | | | |
| Regenerative unit | No entry (None) | | | | | (1) | (2) | | | | (1) | (1) | (2) | (3) | | (3) | (4) | | | | | (5) | | | |
| | R (RGT) | | | | | (1) | (2) | | | | (1) | (1) | (2) | (3) | ● | (3) | (4) | ● | ● | | | (5) | | | |

(1) Regenerative unit is needed if using in a perpendicular position and movement stroke is 700mm or more.
(2) Regenerative unit is needed if using in a perpendicular position.
(3) Regenerative unit is needed if using in a perpendicular position, using at maximum speeds exceeding 1000mm per second, or if using high leads (40).
(4) Regenerative unit is needed if using at maximum speeds exceeding 1000mm per second.
(5) Regenerative unit is needed if using at maximum speeds exceeding 1250mm per second.

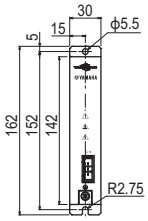
### TS-P

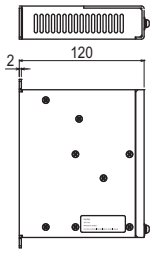
| | | | MF15 / 15D | MF20 / 20D | MF30 / 30D | MF50 / 50D |
|---|---|---|---|---|---|---|
| Power supply voltage / Current sensor | TS-P | 205 | | | | |
| | | 210 | ● | ● | | |
| | | 220 | | | ● | ● |
| Regenerative unit | No entry (None) | | ● | | | |
| | R (RGT) | | | ● | ● | ● |

## Regenerative unit RGT

### Regenerative unit RGT

**Dimensions**



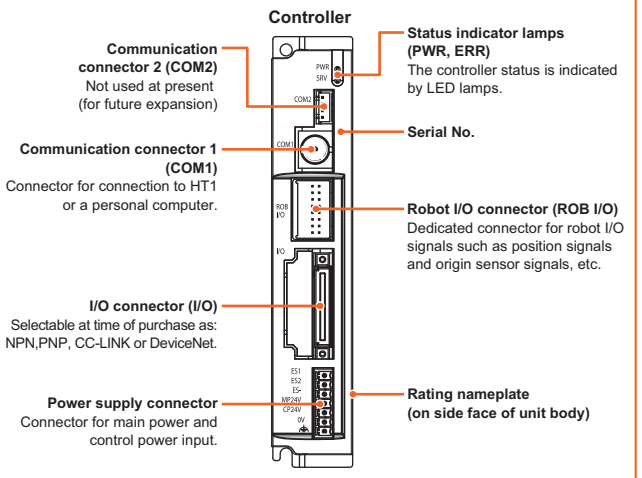

### Basic specifications

| Item | RGT |
|---|---|
| Model | KCA-M4107-0A |
| Dimensions | W30 × H142 × D118mm (Not including installation stay) |
| Weight | 470g |
| Regenerative voltage | Approx. 420V or more |
| Regenerative stop voltage | Approx. 380V or less |
| Accessory | Cable for connection with controller (300mm) |

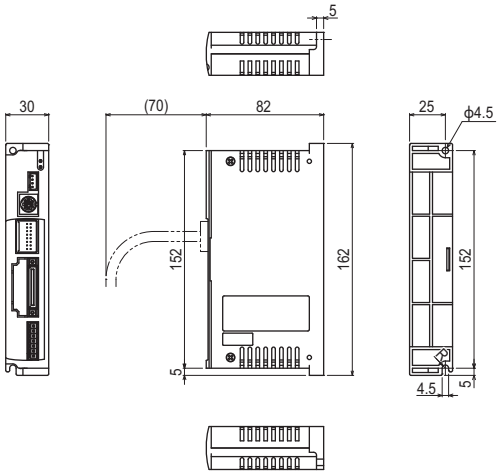
Note. Always leave an empty space (gap of about 20mm) between this unit and the adjacent controller. Also, always use the dedicated cable when connecting the controller.

# TS-S/TS-X/TS-P

## TS-S part names


Controller
Communication connector 2 (COM2)
Not used at present
(for future expansion)
Communication connector 1 (COM1)
Connector for connection to HT1 or a personal computer.
I/O connector (I/O)
Selectable at time of purchase as: NPN,PNP, CC-LINK or DeviceNet.
Power supply connector
Connector for main power and control power input.
Status indicator lamps (PWR, ERR)
The controller status is indicated by LED lamps.
Serial No.
Robot I/O connector (ROB I/O)
Dedicated connector for robot I/O signals such as position signals and origin sensor signals, etc.
Rating nameplate (on side face of unit body)

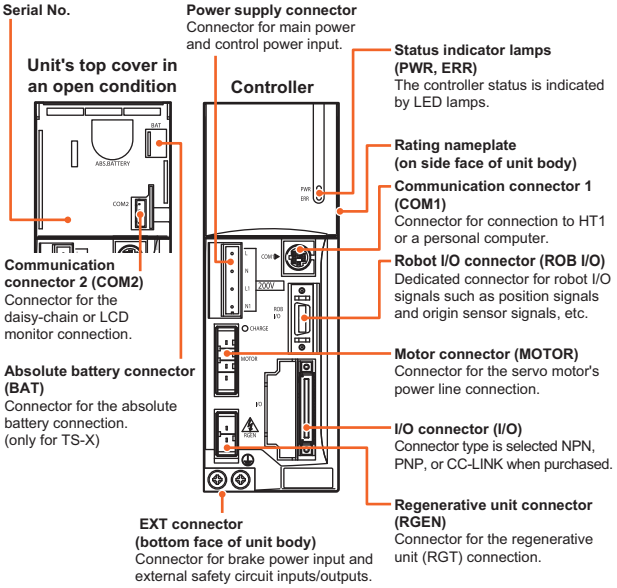
## TS-S dimensions




## TS-S basic specifications

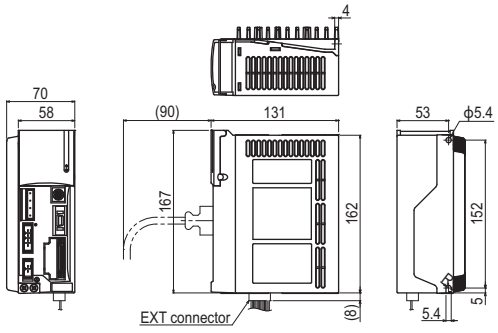
| | Item | | Model: TS-S |
|---|---|---|---|
| Basic specifications | Number of controllable axes | | Single-axis |
| | Controllable robots | | TRANSERVO series |
| | Maximum power consumption | | 70VA |
| | Dimensions | | W30 × H162 × D82mm |
| | Weight | | Approx. 0.2kg |
| | Input power supply | Control power supply | DC24V +/-10% |
| | | Motor power supply | DC24V +/-10% |
| Axis control | Operating method | | I/O point tracing (Positioning operation by specifying point number) |
| | Operation types | | Positioning, merge-positioning, push, and jog operations |
| | Position detection method | | Resolver |
| | Resolution | | 20480 P/rev |
| | Origin search method | | Incremental |
| Points | Points | | 255 points |
| | Point type setting | | (1) Standard setting: Set speed and acceleration in percent of the respective maximum settings.<br>(2) Custom setting: Set speed and acceleration in SI units. |
| | Point teaching method | | Manual data input (coordinates input), Teaching, Direct teaching |
| External input/output | I/O interface | | Selectable from the following: NPN, PNP, CC-Link, DeviceNet |
| | Input | | Servo ON (SERVO), reset (RESET), start (START), interlock (/LOCK) origin search (ORG), manual mode (MANUAL), jog motion - (JOG-), jog motion + (JOG+), Point number selection (PIN0 to PIN7) |
| | Output | | Servo status (SRV-S), alarm (/ALM), operation end (END), operation in-progress (BUSY), control outputs (OUT0 to 3), Point number output 0 to 7 (POUT0 to POUT7) |
| | External communications | | RS-232C 1CH |
| | Safety circuit | | Emergency stop input (2 contact points), main power supply ready output |
| Options | Handy terminal | | HT1, HT1-D (with enable switch) |
| | Support software for PC | | TS-Manager |
| General specifications | Operating temperature | | 0°C to 40°C |
| | Storage temperature | | -10°C to 65°C |
| | Operating humidity | | 35% to 85%RH (non-condensing) |
| | Atmosphere | | Indoor location not exposed to direct sunlight. No corrosive , flammable gases, oil mist, or dust particles |
| | Anti-vibration | | All XYZ directions 10 to 57Hz unidirectional amplitude 0.075mm 57 to 150Hz 9.8m/s$^2$ |
| | Protective functions | | Positioning detection error, power module error, temperature abnormality, overload, overvoltage, low voltage, gross position error |

## TS-X / TS-P part names


Serial No.
Power supply connector
Connector for main power and control power input.
Unit's top cover in an open condition
Controller
Status indicator lamps (PWR, ERR)
The controller status is indicated by LED lamps.
Rating nameplate (on side face of unit body)
Communication connector 1 (COM1)
Connector for connection to HT1 or a personal computer.
Communication connector 2 (COM2)
Connector for the daisy-chain or LCD monitor connection.
Robot I/O connector (ROB I/O)
Dedicated connector for robot I/O signals such as position signals and origin sensor signals, etc.
Absolute battery connector (BAT)
Connector for the absolute battery connection.
(only for TS-X)
Motor connector (MOTOR)
Connector for the servo motor's power line connection.
I/O connector (I/O)
Connector type is selected NPN, PNP, or CC-LINK when purchased.
Regenerative unit connector (RGEN)
Connector for the regenerative unit (RGT) connection.
EXT connector
(bottom face of unit body)
Connector for brake power input and external safety circuit inputs/outputs.

## TS-X / TS-P dimensions

TS-X / TS-P (220)




## TS-X / TS-P basic specifications

| | Item | Model | TS-X / TS-P | | |
|---|---|---|---|---|---|
| Basic specifications | Driver model | | TS-X205 / TS-P205 | TS-X210 / TS-P210 | TS-X220 / TS-P220 |
| | Number of controllable axes | | Single-axis | | |
| | Controllable robots | | TS-X: Single-axis robot FLIP-X series TS-P: Linear motor single-axis robot PHASER series | | |
| | Maximum power consumption | | 400VA | 600VA | 1400VA |
| | Dimensions | | W58 × H162 × D131mm | | W70 × H162 × D131mm |
| | Weight | | Approx. 0.9kg | | |
| | Input power supply | Control power supply | Single phase AC200 to 230V+/-10% 50/60Hz | | |
| | | Motor power supply | Single phase AC200 to 230V+/-10% 50/60Hz | | |
| Axis control | Operating method | | I/O point tracing (Positioning operation by specifying point number) | | |
| | Operation types | | Positioning, merge-positioning, push, and jog operations | | |
| | Position detection method | | TS-X: Resolver with multi-rotation absolute function TS-P: Magnetic type linear scale | | |
| | Resolution | | TS-X: 16384 P/rev TS-P: 1μm | | |
| | Origin search method | | TS-X: Absolute / Incremental TS-P: Incremental / Semi-absolute | | |
| Points | Number of points | | 255 points | | |
| | Point type setting | | (1) Standard setting: Set speed and acceleration in percent of the respective maximum settings.<br>(2) Custom setting: Set speed and acceleration in SI units. | | |
| | Point teaching method | | Manual data input (coordinates input) , Teaching, Direct teaching | | |
| External input/output | I/O interface | | Selectable from the following: NPN, PNP, CC-Link, DeviceNet | | |
| | Input | | Servo ON (SERVO), reset (RESET), start (START), interlock (/LOCK) origin search (ORG), manual mode (MANUAL), jog motion - (JOG-), jog motion + (JOG+),<br>Point number selection (PIN0 to PIN7) | | |
| | Output | | Servo status (SRV-S), alarm (/ALM), operation end (END), operation in-progress (BUSY), control outputs (OUT0 to 3), Point number output 0 to 7 (POUT0 to POUT7) | | |
| | External communications | | RS-232C 1CH | | |
| | Power supply for brake | | DC24V+/-10% 300mA (prepared by the customer) | | |
| | Safety circuit | | Emergency stop input (2 contact points), main power supply ready output | | |
| Options | Handy terminal | | HT1, HT1-D (with enable switch) | | |
| | Support software for PC | | TS-Manager | | |
| General specifications | Operating temperature | | 0°C to 40°C | | |
| | Storage temperature | | -10°C to 65°C | | |
| | Operating humidity | | 35% to 85%RH (non-condensing) | | |
| | Atmosphere | | Indoor location not exposed to direct sunlight. No corrosive , flammable gases, oil mist, or dust particles | | |
| | Anti-vibration | | All XYZ directions 10 to 57Hz unidirectional amplitude 0.075mm 57 to 150Hz 9.8m/s$^2$ | | |
| | Protective functions | | Positioning detection error, power module error, temperature abnormality, overload, overvoltage, low voltage, gross position error | | |
| | Protective structure | | IP20 | | |

## Data overview

Point data and parameter data settings must be specified in order to operate a robot from a TS series controller.

### Point data

The point data used in positioning operations includes items such as the “RUN type”, “Position”, and “Speed”, etc.
Up to 255 points (P1 to P255) can be registered. There are two point data setting types: “Standard setting” type that automatically defines optimal positioning simply by specifying the payload and “Custom setting” type that allows setting the speed (mm/s) and acceleration (m/s2) in SI units. Select the desired setting type according to the application.

### Parameter data

Parameter data is divided into the following categories: “RUN parameters”, “I/O parameters”, “option parameters”, and “servo parameters”.

● Data structure

**Data**

**Point data** — **P1 to P255**

| | | | |
|---|---|---|---|
| 1 | RUN type | 7 | Zone ( ) |
| 2 | Position | 8 | Zone (+) |
| 3 | Speed | 9 | Near width |
| 4 | Accel. | 10 | Jump |
| 5 | Decel. | 11 | Flag |
| 6 | Push | 12 | Timer |

Sets the point data to be used in positioning.
Select the desiredsetting type (“standard setting” or “custom setting”) according to the application.

**(1) Standard setting**
Optimum positioning is provided simply by specifying the payload.

**(2) Custom setting**
Speed and acceleration can be set in SI units.

**Parameter data**

**K1 to K20** — RUN parameter
Specifies parameter settings related to positioning and return to origin operations.

**K21 to K39** — I/O parameter
Specifies parameter settings related to terminal assignments and I/O function selection.

**K80 to K99** — Option parameter
Specifies parameter settings related to options such as CC Link, etc.

**K40 to K79, K100 to ...** — Servo parameter
Specifies parameter settings specified to the connected robot. These parameters are specified during initial processing.

## Point data

### Point data item list

| P1 to P255 | | |
|---|---|---|
| | Item | Description |
| 1 | RUN type | Specifies the positioning operation pattern. |
| 2 | Position | Specifies the positioning target position or movement amount. |
| 3 | Speed | Specifies the positioning speed. |
| 4 | Accel. | Specifies the positioning acceleration. |
| 5 | Decel. | Specifies the positioning deceleration (as a percentage of the acceleration). |
| 6 | Push | Specifies the electrical current limit value for “Push” operations. |
| 7 | Zone (-) | Specifies the “personal zone” output range. |
| 8 | Zone (+) | |
| 9 | Near width | Specifies the “near width” zone (distance tolerance relative to target position). |
| 10 | Jump | Specifies the next movement destination, or the next merge operation merge destination point No. following positioning completion. |
| 11 | Flag | Specifies other information related to the positioning operation. |
| 12 | Timer | Specifies the waiting time (delay) after positioning completion. |

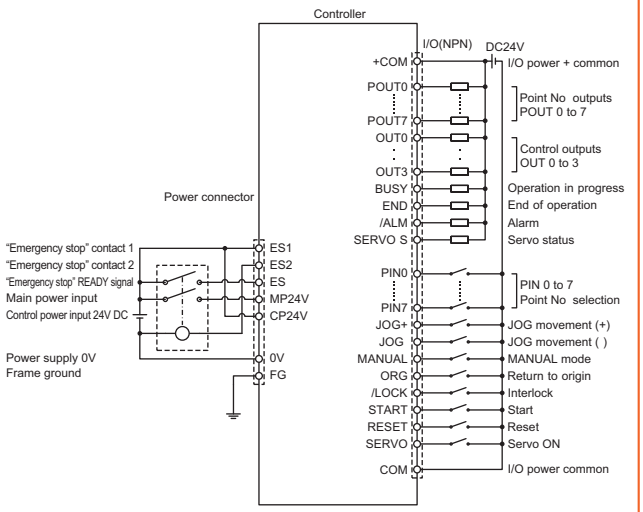
### “Standard setting” and “custom setting”

There are 2 setting types for point data (“standard setting” or “custom setting”). Select the desired setting type according to the application.
The maximum number of setting points for both setting types is 255 points (P1 to P255).

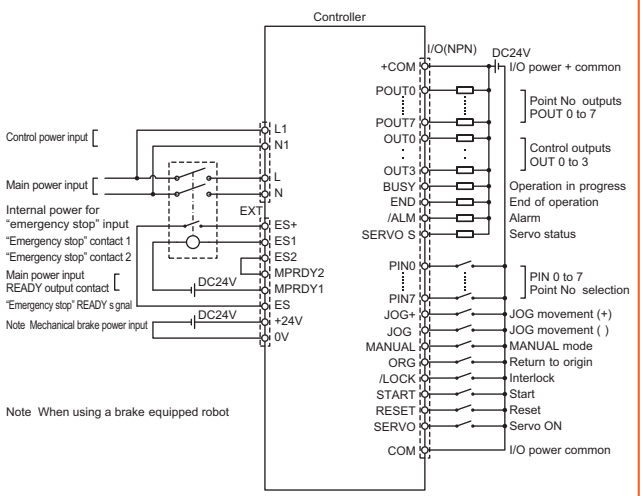
| Setting Type | Description |
|---|---|
| Standard setting | Optimum positioning is provided simply by specifying the payload.<br>This setting type is well-suited to assembly and transport applications. |
| Custom setting | Allows changing the speed and acceleration in SI units so the desired positioning operation can be set.<br>This setting type is suited for machining and inspection systems. |

## NPN type input / output wiring diagram

### TS-S

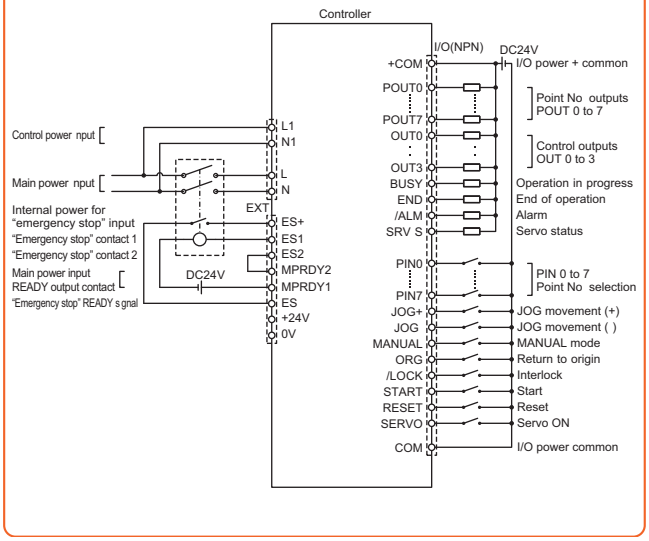



### TS-X



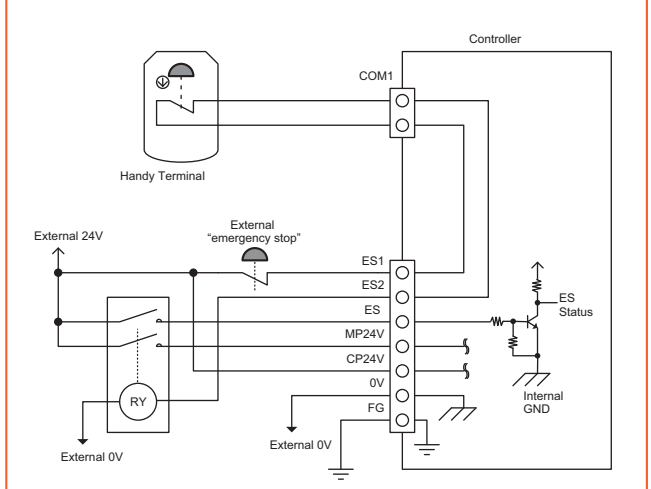

Note When using a brake equipped robot

### TS-P

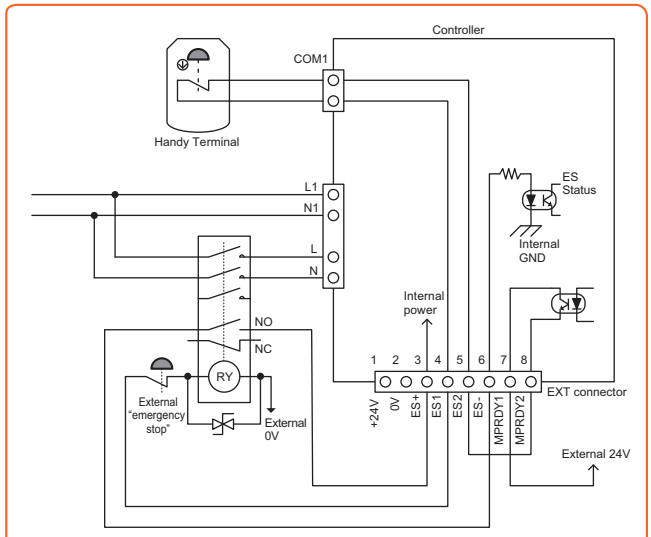



## Emergency stop circuit example

### TS-S (power connector and host unit connection example)




### TS-X / TS-P (EXT connector and host unit connection example)




Note. Always connect a surge absorber unit to the coil on the electromagnetic contactor.

## I/O Specifications

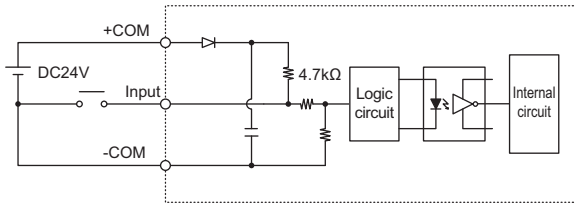
| Item | Description |
|---|---|
| NPN | Input 16 points, 24VDC +/-10%, 5.1mA/point, positive common<br>Output 16 points, 24VDC +/-10%, 50mA/point, sink type |
| PNP | Input 16 points, 24VDC +/-10%, 5.5mA/point, minus common<br>Output 16 points, 24VDC +/-10%, 50mA/point, source type |
| CC-Link | CC-Link Ver.1.10 compatible, Remote station device (1 node) |
| DeviceNet | DeviceNet Slave 1 node |

## I/O signals (NPN / PNP)

| No. | Signal name | | Description |
|---|---|---|---|
| 1 | +COM | | Input power + common |
| 2 | | | |
| 3 | NC | | Use prohibited |
| 4 | NC | | |
| 5 | PIN0 | Inputs | Point No. select |
| 6 | PIN1 | | |
| 7 | PIN2 | | |
| 8 | PIN3 | | |
| 9 | PIN4 | | |
| 10 | PIN5 | | |
| 11 | PIN6 | | |
| 12 | PIN7 | | |
| 13 | JOG+ | | JOG movement (+ direction) |
| 14 | JOG- | | JOG movement (- direction) |
| 15 | MANUAL | | MANUAL mode |
| 16 | ORG | | Return-to-origin |
| 17 | /LOCK | | Interlock |
| 18 | START | | Start |
| 19 | RESET | | Reset |
| 20 | SERVO | | Servo ON |
| 21 | POUT0 | Outputs | Point No. outputs |
| 22 | POUT1 | | |
| 23 | POUT2 | | |
| 24 | POUT3 | | |
| 25 | POUT4 | | |
| 26 | POUT5 | | |
| 27 | POUT6 | | |
| 28 | POUT7 | | |
| 29 | OUT0 | | Control outputs |
| 30 | OUT1 | | |
| 31 | OUT2 | | |
| 32 | OUT3 | | |
| 33 | BUSY | | Operation-inprogress |
| 34 | END | | Operation-end |
| 35 | /ALM | | Alarm |
| 36 | SRV-S | | Servo status |
| 37 | NC | | Use prohibited |
| 38 | NC | | |
| 39 | -COM | | Input power - common |
| 40 | | | |

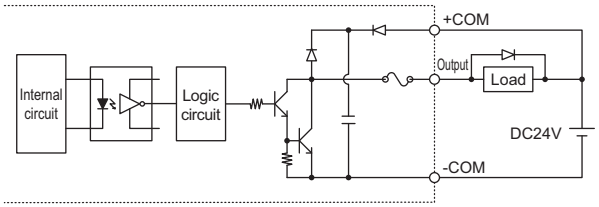
## NPN type I/O circuit details

### Input circuit




**Type : DC input (plus common type)**
Photo-coupler isolation format
**Load : 24VDC +/- 10%, 5.1mA**
OFF voltage : 19.6Vmin (1.0mA)
ON voltage : 4.9Vmax (4.0mA)

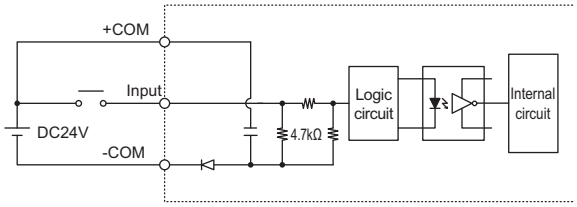
### Output circuit




**Type : NPN open collector output**
(Minus common type)
Photo-coupler isolation format
**Load : 24VDC, 50mA/point**

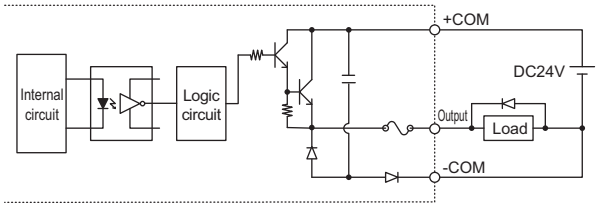
## PNP type I/O circuit details

### Input circuit




**Type : DC input (minus common type)**
Photo-coupler isolation format
**Load : 24VDC +/- 10%, 5.5mA**
ON voltage : 19.6Vmin (4.5mA)
OFF voltage : 4.9Vmax (1.1mA)

### Output circuit




**Type : PNP open collector output**
(Plus common type)
Photo-coupler isolation format
**Load : 24VDC, 50mA/point**

# Accessories and part options

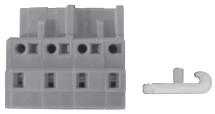
## Standard accessories

### Power connector

TS-S

| Model | KCC-M4421-00 |
|---|---|

### Power connector



TS-X
TS-P

| Model | KAS-M5382-00 |
|---|---|

### EXT connector

For braking power and safety circuit connections.

TS-X
TS-P

| Model | KCA-M5370-00 |
|---|---|

### Dummy connector

TS-S
TS-X
TS-P

| Model | KCA-M5163-00 |
|---|---|

### I/O cables (2m)

TS-S
TS-X
TS-P

| Model | KCA-M4421-20 |
|---|---|

### Absolute battery

TS-X

| Model | KCA-M53G0-00 |
|---|---|

● Absolute battery basic specifications

| Item | Absolute battery |
|---|---|
| Model | KCA-M53G0-00 |
| Battery type | Lithium metallic battery |
| Data holding time | 1year |
| Dimensions | ϕ17 × L50mm |
| Weight | 20g |

Note. The absolute battery is subject to wear and requires replacement. If trouble occurs with the memory then remaining battery life is low so replace the absolute battery. The battery replacement period depends on usage conditions. But generally you should replace the battery after about 1 year counting the total time after connecting to the controller and left without turning on the power.

## Options

### Handy terminal HT1 / HT1-D

Has graphic LCD display wi h backlight for easy viewing.

TS-S
TS-X
TS-P

| | HT1 | HT1-D |
|---|---|---|
| Model | KCA-M5110-0E | KCA-M5110-1E |
| Enable switch | – | 3-position |
| CE marking | Not supported | Applicable |

P.363

### TS-Monitor (LCD monitor)

A liquid crystal display is integrated into this unit. It allows checking each operating state, current position, electrical current and voltage values, etc.

TS-X
TS-P

| Model | For TS-X | KCA-M5119-00 |
|---|---|---|
| | For TS-P | KCA-M5119-10 |

### Support software TS-Manager

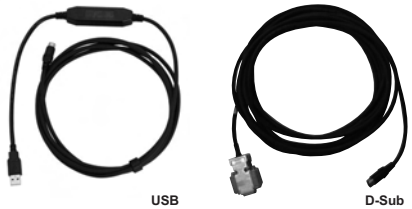
Besides data writing, editing and backup functions, the TS-Manager also offers cycle time simulation and various types of monitor functions.

TS-S
TS-X
TS-P

| Model | KCA-M4966-00 |
|---|---|

### Data cables

TS-Manager data cable.
Select from USB cable or D-sub cable.




| Model | USB type (5m) | KCA-M538F-A0 |
|---|---|---|
| | D-Sub type (5m) | KCA-M538F-00 |

● TS-Manager environment

| | |
|---|---|
| OS | Microsoft Windows 2000/XP/Windows Vista |
| CPU | Exceeding the environment recommended by the OS being used |
| Memory | Exceeding the environment recommended by the OS being used |
| Hard disk | Vacant capacity of more than 20MB in the installation destination drive |
| Communication port | Serial (RS-232C), USB |
| Applicable controllers | TS-S / TS-X / TS-P |

Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.

P.362

Support software for PC

# TS-Manager

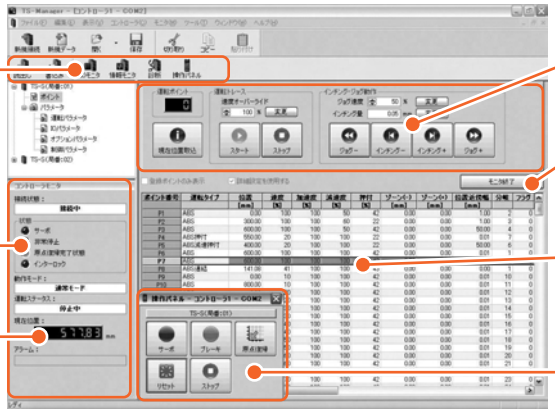
## Applicable controllers ▶ TS-S TS-X TS-P

Besides basic functions, such as point data edit and backup, this support software TS-Manager incorporates various convenient functions to efficiently process the system debugging and analysis. The TS-Manager helps you in every scene from the system setup to the maintenance.

## Features

### 1 Basic functions

Detailed settings by point, such as the position information, operation pattern, speed, acceleration, and deceleration settings, and robot parameter settings can be set, edited, and backed up. Additionally, the basic operation of the robot, such as JOG movement or inching operation can also be controlled through the TS-Manager.

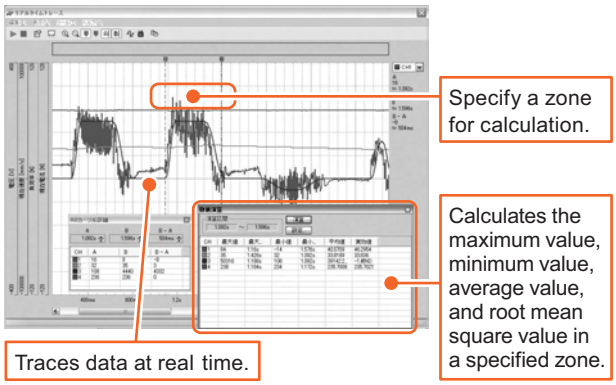

Only clicking relevant icon will show the operation panel or I/O monitor.
Shows the servo or emergency stop status, and operation mode.
Shows the current position at real time.
JOG movement, inching operation, and current position acquisition buttons.
Turns ON or OFF the operation point monitoring.
Shows the data in easy to read tabular format.
Exchanging data with a spreadsheet application, such as Excel is also easy.
Operation panel for servo status, brake ON/OFF, and stop.

Note. Excel is a registered trademark of Microsoft Corporation in the United States and/or other countries.

### 2 Real-time trace

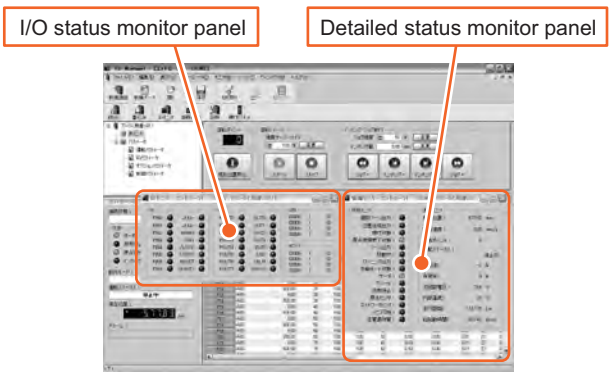
This function traces the current position, speed, load factor, current value, and voltage value at real-time. Additionally, as trigger conditions are set, data can be automatically obtained when these conditions are satisfied. Furthermore, as a zone is specified from the monitor results, the maximum value, minimum value, and average value can be calculated. These values are useful for the analysis if a trouble occurs.

| Real-time traceable items (up to four items) | | |
|---|---|---|
| • Voltage value | • Current value | • Motor load factor |
| • Command speed | • Current speed | • Internal temperature |
| • Command current value | • Present current value | • Input/output I/O status |
| • Word input/output status | | |


Specify a zone for calculation.
Calculates the maximum value, minimum value, average value, and root mean square value in a specified zone.
Traces data at real time.

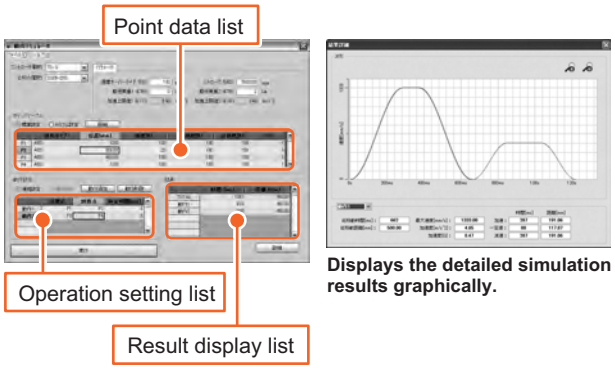
### 3 Various monitor functions and detailed error logs

The robot operation status (operation mode or servo status) and I/O status can be monitored.
Additionally, the Alarm Log screen also displays the input/output I/O status in addition to the carrier position, speed, operation status, current value, and voltage value in case of an alarm. This greatly contributes to the status analysis.




### 4 Operation simulation

As the operation condition data or point data is input, a period of time necessary for operation is simulated.
Use of this function makes it possible to select an optimal model before purchase and simulate the speed and acceleration/deceleration settings without use of actual machine.
It is also possible to link this operation simulation function with the TS-Manager main software. This easily affects the point data you have edited in the actual machine.




**Displays the detailed simulation results graphically.**

Handy terminal

# HT1/HT1-D

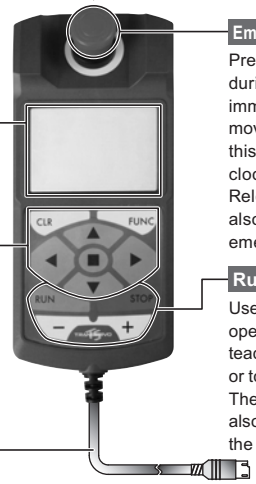
## Applicable controllers ▶ TS-S TS-X TS-P

This Handy Terminal is a device that can perform any operation such as robot manual operation, point data edit, teaching, and parameter setting, etc.
Has graphic LCD display with backlight for easy viewing.

## HT1 / HT1-D basic specifications

| Name | | HT1 | HT1-D |
|---|---|---|---|
| External view | | | |
| Applicable controllers | | TS-S / TS-X / TS-P | |
| Model | Japanese specifications | KCA-M5110-0J | KCA-M5110-1J |
| | English specifications | KCA-M5110-0E | KCA-M5110-1E |
| Display | | Dot matrix monochrome display (with backlighting) 32 characters × 10 lines | |
| Operation keys | | Mechanical switch | |
| Emergency stop button | | Normally closed contact point (with lock function) | |
| Enable switch | | - | 3-position |
| Safety connector | | - | 15 pin D-sub connector (male) |
| CE marking | | Not supported | Applicable |
| Operating temperature | | 0°C to 40°C | |
| Operating humidity | | 35% to 85%RH (non-condensing) | |
| Dimensions | | W88 × H191 × D45mm (Emergency stop button not included.) | |
| Weight | | 260g (not including cable) | 300g (not including cable) |
| Cable length | | 3.5m | |

## Part names and function




**Strap holder**
Attaching a short strap or necklace strap here prevents dropping the HT1 while operating it or installing it onto equipment.

**LCD screen**
This is a liquid crystal display (LCD) screen with 32 characters × 10 lines (pixel display), showing the operation menus and various types of information.

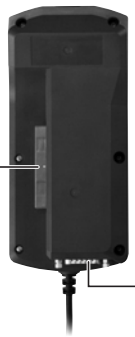
**Data edit keys**
Use these keys to select menus and edit various data.

**Connector cable**
This cable connects to the controller. One end of this cable is terminated with an 8-pin MD connector (male). Plug this cable into the COM1 connector on the controller front panel.

**Emergency stop button**
Pressing this button during operation immediately stops robot movement. To release this button, turn it clockwise.
Releasing this button also cancels emergency stop.

**Run/stop keys**
Use these keys to operate the robot for teaching or positioning, or to stop operation.
The ⊖ and ⊕ keys are also provided to move the robot in jog mode.

## HT1-D rear side



**Enable switch (only on HT1-D)**
This switch is effective for use with remote safety circuits. This switch cuts off the circuit when pressed or released but allows circuit operation when in the middle position.

**Safety connector (only on HT1-D)**
Use with remote safety circuits triggered by the emergency stop button or enable switch.

Field network system with minimal wiring

# NETWORK

## Applicable controllers ▶ TS-S TS-X TS-P

### Network modules CC-Link

- Option unit with networking functions that can be incorporated in YAMAHA robot controllers, TS-S / TS-X / TS-P.
- As connection of the robot system and the sequencer requires only one (4-wire) dedicated cable, it is possible to save wiring of the entire system, which contributes to efficient wiring work, reduction of installation and maintenance costs, etc.
- 16 input/outputs usable as I/O.
- Operation occurs as a CC-Link remote device station, on a one-unit to one-station basis.
- Remote commands can read or write point data and load each type of status.

#### Basic specifications for network modules CC-Link

| Item | Network modules CC-Link |
|---|---|
| Applicable controllers | TS-S / TS-X / TS-P |
| Version supporting CC-Link | Ver. 1.10 |
| Remote node type | Remote device node |
| Number of occupied nodes | 1 node |
| Node number setting | 1 to 64 |
| Communication speed setting | 10Mbps, 5Mbps, 2.5Mbps, 625Kbps, 125Kbps |
| No. of CC-Link inputs/outputs | Input 16 points , Output 16 points |
| Shortest distance between nodes[Note1] | 0.2m or more |
| Overall extension distance[Note1] | 100m/10Mbps, 160m/5Mbps, 400m/2 5Mbps, 900m/625Kbps, 1200m/156Kbps |
| Monitor LED | L RUN, L ERR, SD, RD |

Note 1. These values apply when a cable that supports CC-Link Ver.1.10 is used.

### Network modules DeviceNet

- Option unit with networking functions that can be incorporated in YAMAHA robot controllers, TS-S / TS-X / TS-P.
- As connection of the robot system and the sequencer requires only one (4-wire) dedicated cable, it is possible to reduce wiring of the entire system, which contributes to efficient wiring work, reduction of installation and maintenance costs, etc.
- 16 input/outputs usable as I/O.
- Operate as slave stations, with each unit occupying 6 input and 6 output channels.
- Remote commands can read or write point data and load each type of status.

#### Basic specifications for network modules DeviceNet

| Item | | Network modules DeviceNet |
|---|---|---|
| Applicable controllers | | TS-S / TS-X / TS-P |
| Applicable DeviceNet specifications | | Volume 1 Release2 0/Volume 2 Release2 0 |
| Device type | | Generic Device (device number 0) |
| Number of occupied CH | | Input 6ch, Output 6ch |
| MAC ID setting | | 0 to 63 |
| Communication speed setting | | 500Kbps, 250Kbps, 125Kbps |
| DeviceNet inputs/outputs | | Input 16 points, Output 16 points |
| Network length | Overall extension distance | 100m/500Kbps, 250m/250Kbps, 500m/125Kbps |
| | Branch length | 6m or less |
| | Overall branch length | 39m or less/500Kbps, 78m or less/250Kbps, 156m or less/125Kbps |
| Monitor LED | | Module, Network |

Single axis

# RDX/RDP

Robot driver  Only for pulse train control

As the size is small and weight is light,
it is easy to include in the automated unit.

RDX RDP

Main functions ▶ P.033

## Features

### 1 Dedicated pulse train control

Driver functions by dedicated pulse train control which yields a compact body and a low price!

### 2 Cost reduction to a large extent is possible in designing the system

Driver easily assembles into automated equipment so a drastic amount of effort needed for tasks such as design, part selection and settings can be eliminated and a huge cost reduction achieved!

### 3 Compact

Compact design of H160 × W57 × D130mm.

### 4 Command input: Line driver signal (2Mpps)

### 5 Command output: ABZ phase output (with divider function)

### 6 Analog monitor output function

Monitor can show analog outputs such as for speed or electrical current giving the operator a real-time look at operating status.
Dedicated support software TOP can be used to show fully graphic displays.

## Model Overview

| Name | RDX | RDP |
|---|---|---|
| Power | ● Main power supply 3-phase 200 to 230V +10% to -15% (50/60Hz +/-5%)<br>● Control power supply Single phase 200 to 230V +10% to -15% (50/60Hz +/-5%) | |
| Operating method | Pulse train control | |
| Maximum number of controllable axes | Single-axis | |
| Position detection method | Incremental | |
| Controllable robot | Single-axis robot FLIP-X Note1 | Linear motor single-axis robot PHASER Note2 |
| Support software for PC | TOP | |

Note 1. Exclude T4 / T5 / C4 / C5 / YMS
Note 2. Exclude MF100

## Ordering method

● RDX

| RDX | – | | – | |
|---|---|---|---|---|
| Controller | | Driver Note | | Regenerative unit Note |
| | | 05: 100W or less | | RBR1 |
| | | 10: 200W or less | | RBR2 |
| | | 20: 400W or less | | |

Note. Driver selection and regenerative unit selection depends on the robot type.
See the selection table on the next page for selecting the driver/regenerative circuit.

● RDP

| RDP | – | | – | |
|---|---|---|---|---|
| Controller | | Driver Note | | Regenerative unit Note |
| | | 05: 100W or less | | No entry: None |
| | | 10: 200W or less | | RBR1 |
| | | 20: 400W or less | | RBR2 |

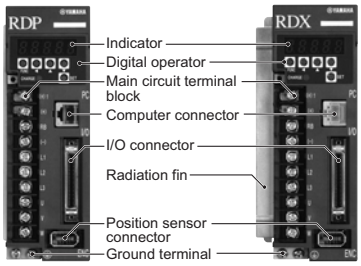
Note. Driver selection and regenerative unit selection depends on the robot type.
See the selection table on the next page for selecting the driver/regenerative circuit.

# RDX/RDP

## Part names

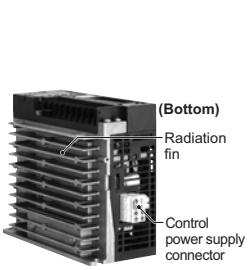
**RDX-05 / 10**
**RDP-05 / 10**

Note : The photo shows the front of RDP-05 / 10. The same applies to RDX-05 / 10.



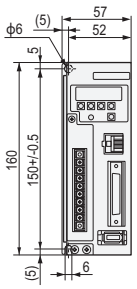

**RDX-20**
**RDP-20**

Note : The photos show the front (left) and the underside (right) of RDX-20. The same applies to RDP-20.

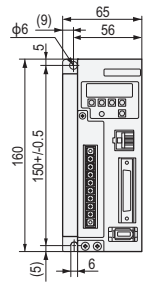



## Dimensions

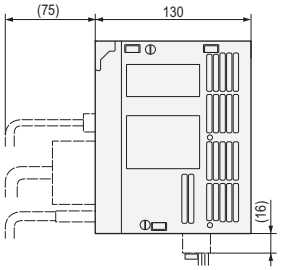
**RDX-05 / 10**
**RDP-05 / 10**




**RDX-20**
**RDP-20**




**RDX-05 / 10 / 20**
**RDP-05 / 10 / 20 side**




## Driver / regenerative unit selection table

### RDX

| | | | FLIP-X | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | T4H/ C4H | T5H/ C5H | T6/ C6 | T9 | T9H | F8 / C8 | F8L/ C8L | F8LH/ C8LH | F10/ C10 | F14/ C14 | F14H/ C14H | F17/ C17 | F17L/ C17L | F20/ C20 | F20N | N15 | N18 | N15D | N18D | B10 | B14 | B14H | R5 | R10 | R20 |
| Driver selection | RDX | 05 | ● | ● | ● | ● | | ● | ● | ● | ● | ● | | | | | | | | | | ● | ● | | ● | ● | |
| | | 10 | | | | | ● | | | | | | ● | | | | | | | | | | | ● | | | ● |
| | | 20 | | | | | | | | | | | | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | |
| Regenerative unit | No entry (None) | | ● | ● | | | | | | | | | | | | | | | | | | | | | | | |
| | RBR1 | | | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ❶ | ● | ❶ | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | RBR2 | | | | | | | | | | | | | ❶ | | ❶ | | | | | | | | | | | |

❶ If placed horizontally the RBR1 is required, if placed vertically then RBR2 is required.

### RDP

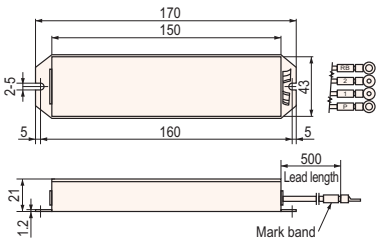
| | | | PHASER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | MR12/ MR12D | MR16/ MR16D | MR16H/ MR16HD | MR20/ MR20D | MR25/ MR25D | MF15/ MF15D | MF20/ MF20D | MF30/ MF30D | MF50/ MF50D |
| Driver selection | RDP | 05 | ● | ● | | | | | | | |
| | | 10 | | | ● | | ● | | | | |
| | | 20 | | | | ● | | ● | ● | ● | ● |
| Regenerative unit | No entry (None) | | ● | | | ● | | ● | ● | | |
| | RBR1 | | | ● | ● | | ● | | | ● | ● |

## Regenerative unit RBR1 / RBR2 dimensions

The regenerative unit is a device that converts the braking current generated when the motor decelerates into heat.
Regenerative unit is required for specified Yamaha models and for operation with loads having large inertia.

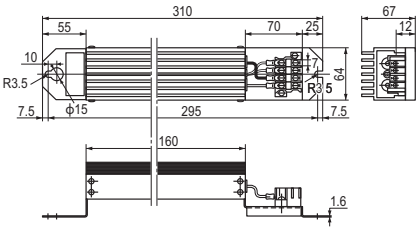
### Regenerative unit RBR1

**Dimensions**




### Regenerative unit RBR2

**Dimensions**




## Regenerative unit RBR1 / RBR2 basic specifications

| Item | RBR1 | RBR2 |
|---|---|---|
| Model | KBH-M5850-00 | KBH-M5850-10 |
| Capacity type | 120W | 200W |
| Resistance value | 100Ω | 100Ω |
| Permissible braking frequency | 2.5% | 7.5% |
| Permissible continuous braking time | 12 sec. | 30 sec. |
| Weight | 0.27kg | 0.97kg |

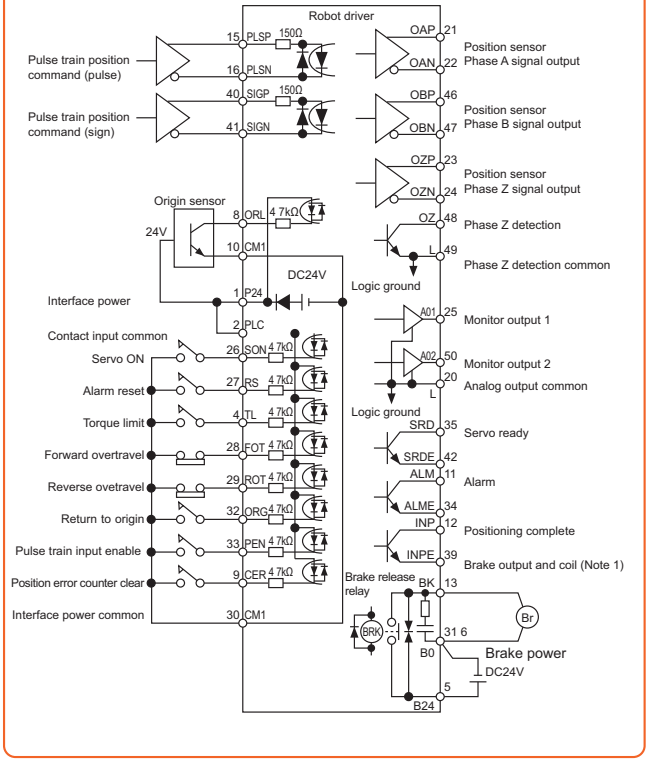
Note. The internal thermal contact point capacity is AC250V, 2A max. ON (b contact point) in the normal state.
Note. The built-in thermal fuse prevents abnormal heat generation which occurs by an erroneous use. (not resettable)
Note. When the thermal relay has worked, reduce the regeneration energy by either stopping the servo amplifier or making the deceleration time longer.
Note. With the regenerative unit, specifications and whether or not required may vary depending on each robot and its operation conditions.

## Basic specifications

| Item | | Model | RDX | | | RDP | | |
|---|---|---|---|---|---|---|---|---|
| Driver model | | | RDX-05 | RDX-10 | RDX-20 | RDP-05 | RDP-10 | RDP-20 |
| Number of controllable axes | | | Single-axis | | | | | |
| Controllable robots | | | Single-axis robot FLIP-X | | | Linear motor single-axis robot PHASER (exclude MF100) | | |
| Basic specifications | Capacity of the connected motor | | 200V 100W or less | 200V 200W or less | 200V 400W or less | 200V 100W or less | 200V 200W or less | 200V 400W or less |
| | Maximum power consumption | | 0.3kVA | 0.5kVA | 0.9kVA | 0.3kVA | 0.5kVA | 0.9kVA |
| | Dimensions | | W57 × H160 × D130mm | | W65 × H160 × D130mm | W57 × H160 × D130mm | | W65 × H160 × D130mm |
| | Weight | | 0.8kg | | 1.0kg | 0.8kg | | 1.0kg |
| | Input power supply | Control power supply | Single phase 200 to 230V+10%, -15%, 50/60Hz+/-5% | | | | | |
| | | Motor power supply | 3-phase 200 to 230V+10%, -15%, 50/60Hz+/-5% | | | | | |
| Axis control | Position detection method | | Resolver | | | Magnetic linear scale | | |
| | Control system | | Sine-wave PWM (pulse width modulation) | | | | | |
| | Control mode | | Position control | | | | | |
| | Maximum speed | | 5000rpm | | | 3.0m/s | | |
| Input/output related function | Position command input | | Line driver signal (2M pulses/s or less)<br>(1) Forward pulse + reverse pulse (2) Sign pulse + Command pulse<br>(3) 90-degree phase difference 2-phase pulse command (maximum frequency: 500k pulses/s.)<br>One of (1) to (3) is selectable. | | | | | |
| | Input signal | | 24V DC contact point signal input (usable for sink/source) (24V DC power supply incorporated)<br>(1) Servo ON (2) Alarm reset (3) Torque limit (4) Forward overtravel (5) Reverse overtravel<br>(6) Origin sensor (7) Return-to-origin (8) Pulse train input enable (9) Deviation counter clear | | | | | |
| | Output signal | | Open collector signal output (usable for sink/source)<br>1) Servo ready 2) Alarm 3) Positioning completed | | | | | |
| | Relay output signal | | Braking cancel signal (24V 375mA) | | | - | | |
| | Position output | | Phase A, B signal output: Line driver signal output<br>Phase Z signal output: Line driver signal output / open collector signal output<br>N/8192 (N=1 to 8191), 1/N (N=1 to 64) or 2/N (N=3 to 64) | | | | | |
| | Monitor output | | Selectable items: 2ch, 0 to +/-3V voltage output, speed detection value, torque command, etc. | | | | | |
| Internal function | Built-in operator | | 5-digit number indicator, key input x 5 | | | | | |
| | External operator | | PC software “TOP” monitoring function, parameter setting function, operation tracing function, trial operation function, etc.<br>RS232C port in use, PC with Windows 95/98/Me, Windows NT/2000/XP can be connected | | | | | |
| | Regenerative braking circuit | | Included (but without braking resistor) | | Included | Included (but without braking resistor) | | Included |
| | Dynamic brake | | Included (Operation conditions can be set.) (No DB resistor, connection: 2-phase short circuit) | | | | | |
| | Protective function | | Open type (IPOO) | | | | | |
| | Protective functions | | Over-current, overload, braking resistor overload, main circuit overvoltage, memory error, etc. | | | | | |
| Options | Support software for PC | | TOP | | | | | |
| General specifications | Operating temperature | | 0°C to +40°C | | | | | |
| | Storage temperature | | -10°C to +70°C | | | | | |
| | Operating humidity | | 20% to 90%RH (non-condensing) | | | | | |
| | Vibration | | 5.9m/s$^2$ (0.6G) 10 to 55Hz | | | | | |

Note. These data are parameters and calculation range in controlling the robot driver and do not indicate the capacity of the robot at the maximum speed.
Note. GXL-8FB (made by SUNX) or FL7M-1P5B6-Z (made by YAMATAKE) is used for the origin sensor. The power consumption of the origin sensor is 15mA or less (at open output) and only 1 unit of the origin sensor is connected to each robot driver. (future specification)
Note. Use the dynamic brake for emergency stop. Note that the braking may be less effective depending on the robot model.
Note. JEM1030 is used as the base for the protection method.
Note. Storage temperature applies to the temperature during transportation.
Note. The JIS C0040 test method is uses as the base.

## Input / output signal connection diagram




## List of RDP / RDX terminal functions

| Type | Terminal symbol | Terminal name | Description |
|---|---|---|---|
| Input signal | P24 | Interface power | Supplies 24V DC for contact inputs. Connecting this signal to the PLC terminal allows using the internal power supply. Use this terminal only for contact input. Do not use for controlling external equipment connected to the robot driver, such as brakes |
| | CM1 | Interface power common | This is a ground signal for the power supply connected to P24. If using the internal power supply then input a contact signal between this signal and the contact-point signal. |
| | PLC | Intelligent input common | Connect this signal to the power supply common contact input. Connect an external supply or internal power supply (P24). |
| | SON | Servo ON | Setting this signal to ON turns the servo on (supplies power to motor to control it). This signal is also used for estimating magnetic pole position when FA-90 is set to oFF or oFF2. |
| | RS | Alarm reset | After an alarm has tripped, input ing this signal cancels the alarm. But before inputting this reset signal, first set the SON terminal to OFF and eliminate the cause of the trouble. |
| | TL | Torque limit | When this signal is ON, the torque limit is enabled. |
| | FOT | Forward overtravel | When his signal is OFF, the robot will not run in forward direc ion. (Forward direction limit signal) |
| | ROT | Reverse overtravel | When his signal is OFF, the robot will not run in reverse direction. (Reverse direction limit signal) |
| | ORL | Origin sensor | Input an origin limit switch signal showing the origin area. |
| | ORG | Return-to-origin | Inputting this signal starts return-toorigin operation. |
| | PEN | Pulse train input enable | When this signal is turned on, the pulse train position command input is enabled. |
| | CER | Position error counter clear | Inputting this signal clears the position deviation (position error) counter. (Position command value is viewed as current position.) |
| Analog common | L | Analog common | This is the ground for the analog signal. |
| Output signal | SRD SRDE | Servo ready | This signal is output when the servo is ready to turn on (with main power supply turned on and no alarms tripped.) |
| | ALM ALME | Alarm | An alarm signal is output when an alarm has tripped. (This signal is ON in normal state and OFF when an alarm has tripped ) |
| | INP INPE | Positioning complete | This signal is output when the deviation between the command position and current position is wi hin the preset positioning range. |
| Relay output | BK (B24) (Note 1) | Brake release relay output | When the servo is ON, this terminal outputs a signal to allow releasing the brake. (FLIP-X series only) |
| Monitor output | AO1 | Monitor output 1 | Outputs speed detection values, torque commands, etc. as analog signal voltages for monitoring. Signals to output are selected by setting parameters. These signals are only for monitoring. Do not use for control. |
| | AO2 | Monitor output 2 | |
| | L | Monitor output common | This is the ground for the monitor signal. |
| Position command | PLSP | Position command pulse (pulse signal) | Select one of the following signal forms as the pulse-train position command input. (1) Command pulse + direction signal (2) Forward direction pulse train + reverse direction pulse train (3) Phase difference 2-phase pulse |
| | PLSN | | |
| | SIGP | Position command pulse (sign signal) | |
| | SIGN | | |
| Position sensor monitor | OAP | Position sensor Phase A signal | Outputs monitor signal obtained by dividing “phase A” signal of position sensor. |
| | OAN | | |
| | OBP | Position sensor Phase B signal | Outputs monitor signal obtained by dividing “phase B” signal of position sensor. |
| | OBN | | |
| | OZP | Position sensor Phase Z signal | Outputs monitor signal for position sensor “phase Z” signal. |
| | OZN | | |
| | OZ | Phase Z detection | Outputs monitor signal for position sensor “phase Z” signal. |
| | L | Phase Z detection common | |
| Braking power input | B24 (Note 1) | Brake power input | Input 24V DC brake power to this terminal. |
| | B0 (Note 1) | Brake power common | Common terminal input for brake power. |

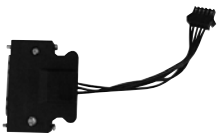
Note 1. B24, BO and BK are available only with RDX, and not with RDP.

## Standard accessories

### I/O connector (no brake wiring)

| Model | KBH-M4420-00 |
|---|---|

### I/O connector (with brake wiring)



| Model | KBH-M4421-00 |
|---|---|

### Control power supply connector

| Model | KBH-M4422-00 |
|---|---|

Support software for PC

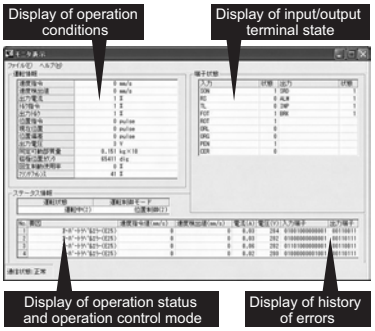
# TOP Windows Tool for Optimizing Parameters Software for setup

This software is intended exclusively for RDP/RDX.Using the Windows operating computer, it is possible to set parameters, to monitor the position, speed and torque and to have graphics displayed, assuring pleasant and easy operation in the Windows® 95/98/ME, Windows NT®, Windows® 2000 or Windows® XP environment.

## Features

### 1 Monitoring function

It is possible to monitor the operation condition and output state in real time.

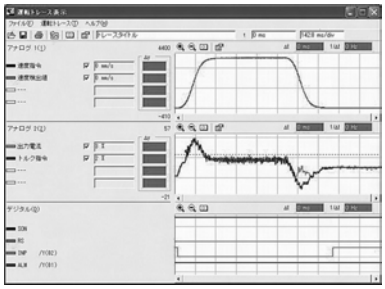

Display of operation conditions
Display of input/output terminal state
Display of operation status and operation control mode
Display of history of errors

### 2 Setting parameters

It is possible to set, change, print and store the parameters.

### 3 Operation tracing function

It is possible to have the servo motor speed and electric current displayed in the form of graphics.



## Communication cable for PC supporting software TOP (2m)

Communication cable to connect PC and a controller.

| Model | KBH-M538F-00 |
|---|---|

## Support software TOP

TOP is RDX / RDP dedicated software.

| Model | KBH-M4966-00 |
|---|---|

### Environment

| | |
|---|---|
| PC | DOS/V PC |
| OS | Windows® 95/98/Me<br>Windows NT®<br>Windows® 2000<br>Windows® XP |
| Communication method | RS-232C |

Note. Windows® 95/98/Me, Windows NT®, Windows® 2000 and Windows® XP are trademarks of Microsoft Corporation registered in U.S.A. and other countries.

Single axis

# ERCD

Robot controller  Dedicated for T4 / T5 / C4 / C5 / YMS

Low price and compact in size.
In addition to the conventional functions,
a pulse train function is added for a wider application range.

Main functions ▶ P.034

## Features

### 1 Supports 5 operating methods including pulse train, programming, point trace, remote command, online instructions

### 2 Reinforced sequence function

More system layout freedom! Now easier to use than ever before!

### 3 Torque restriction control

This function limits the maximum torque during robot movement via a program command. It allows operations such as press-fit, push, and gripping, etc.

### 4 Zone output function

This function controls the signal output (on/off) when the robot position enters within a specified range or zone. It can be set to trigger at area decision made by upstream device.

## Model Overview

| | |
|---|---|
| Name | ERCD |
| Power | DC24V |
| Operating method | Pulse train control / Programming / I/O point tracing / Remote command / Operation using RS-232C communication |
| Maximum number of controllable axes | Single-axis |
| Position detection method | Incremental |
| Controllable robot | Deicated for T4 / T5 / C4 / C5 / YMS |
| Programming box | HPB / HPB-D (with enable switch) P.393 |
| Support software for PC | POPCOM P.391 |

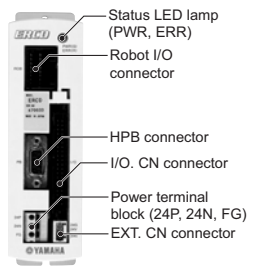
## Ordering method

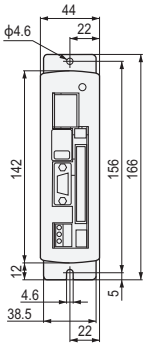
**ERCD** – [ ]

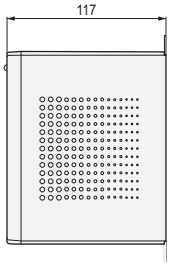
Controller – I/O connector specification

CN1: I/O flat cable 1m (Standard)
CN2: Twisted-pair cable 2m (pilse train function)

## Part names / dimensions




## Standard accessories

### 24V power connector (for EXT. CN)

| Model | KAU-M4422-00 |
|---|---|

### I/O flat cable (CN1)

Connector and flat cable used to connect the standard parallel I/O of the ERCD / SRCP30 controllers and an external equipment (sequencer). The cable is 1m long with its end cut and left as it is.

| Model | KAU-M4421-00 |
|---|---|

### I/O twisted-pair cable (CN2)

Connector and twisted pair cable used to connect parallel I/O of ERCD / SRCP30 controllers and an external equipment. The cable is 2m long with its end cut and left as it is. Select CN2 when using the pulse train input equipment.

| Model | KAU-M4421-10 |
|---|---|

## Basic specifications

| Item / Model | | | | | ERCD |
|---|---|---|---|---|---|
| Number of controllable axes | | | | | Single-axis |
| Controllable robots | | | | | Single-axis robot FLIP-X series T4 / T5 / C4 / C5 / YMS |
| Basic specifications | Capacity of the connected motor | | | | DC24V 30W or less |
| | Dimensions | | | | W44 × H166 × D117mm |
| | Weight | | | | 0.45kg |
| | Input power supply | | | | DC24V+/-10% maximum 3A to 4.5A<br>(Variable depending on robots in use.) |
| Axis control | Drive method | | | | AC full-digital software servo |
| | Position detection method | | | | Resolver |
| | Operating method | | | | Normal mode: point trace movement, program operation, operation using RS-232C communication<br>Pulse Train mode: operation by pulse train input |
| | Position indication units | | | | mm (millimeters) |
| | Speed setting | | | | 1% to 100% (Setting by 1% unit) |
| | Acceleration setting | | | | 1. Automatic speed setting per robot No. and payload<br>2. Setting based on acceleration and deceleration parameter 1% to 100% (Setting by 1% unit) |
| | Resolution | | | | 16384 P/rev |
| | Origin search method | | | | Incremental |
| Program | Program language | | | | YAMAHA SRC |
| | Multitasks | | | | 4 tasks |
| | Point-data input method | | | | Manual data input (coordinates input), Direct teaching, Remote teaching |
| Memory | RAM | | | | 32 Kbytes with lithium battery backup (5-year life) Retains programs, point data, parameters and alarm history |
| | Programs | | | | 100 programs (Maximum program number)<br>255 steps per program 1024 steps / total or less |
| | Points | | | | 1000 points (256 when point tracing) |
| External input/output | I/O interface | Normal mode Note1 | Sequence input | | Dedicated input 8 points, General input 6 points |
| | | | Sequence output | | Dedicated input 3 points, General input 6 points, Open collector output |
| | | Pulse train mode Note1 | Sequence input | | Dedicated input 5 points, General input 6 points |
| | | | Sequence output | | Dedicated input 3 points, General input 6 points, Open collector output |
| | | | Command pulse input | Type | 1.Phase A / phase B, 2.Pulse / code, 3.CW / CCW |
| | | | | Mode | Line driver (+5V) |
| | | | | Frequency | Maximum 2 Mpps |
| | | Feedback pulse output | | Terminal name | PA+, PA-, PB+, PB-, PZ+, PZ- |
| | | | | Type | Phase A / phase B / phase Z |
| | | | | Mode | Line driver (+5V) |
| | | | | Number of pulse | 16 to 4096 P/rev |
| | | Power supply for sequence I/O | | | External DC +24V input |
| | Emergency stop input | | | | Normal close contact point input |
| | Brake output | | | | Relay output (for 24V/300mA brake) 1CH |
| | External communications | | | | RS-232C 1CH (For communication with HPB or PC) |
| Options | Programming box | | | | HPB, HPB-D (with enable switch) |
| | Support software for PC | | | | POPCOM |
| General specifications | Operating temperature | | | | 0°C to 40°C |
| | Storage temperature | | | | -10°C to 65°C |
| | Operating humidity | | | | 35% to 85%RH (non-condensing) |
| | Noise resistance capacity | | | | IEC61000-4-4 Level 2 |
| | Protective functions | | | | Overload, overvoltage, voltage drop, resolver wire breakage, runaway detection, etc. |

Note 1. Switching between the normal mode and pulse train mode is done by use of the parameter.

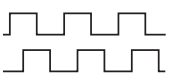
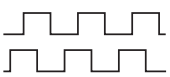
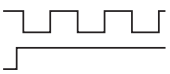
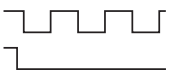
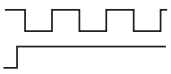
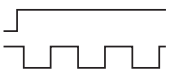
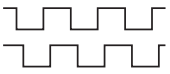
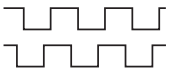
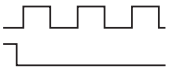
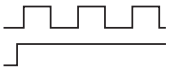
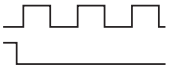
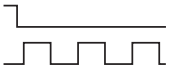
## Connector I/O signals

| Terminal number | Signal name | Function |
|---|---|---|
| A-1 | ABS-PT | Move the point from the origin position |
| B-1 | INC-PT | Move the point from the current position |
| A-2 | AUTO-R | Start automatic operation |
| B-2 | STEP-R | Start step operation |
| A-3 | ORG-S | Return to the origin |
| B-3 | RESET | Reset |
| A-4 | SERVO | Return to servo on |
| B-4 | LOCK | Interlock |
| A-5 | DI 0 | General input 0 |
| B-5 | DI 1 | General input 1 |
| A-6 | DI 2 | General input 2 |
| B-6 | DI 3 | General input 3 |
| A-7 | DI 4 | General input 4 |
| B-7 | DI 5 | General input 5 |
| A-8 | (SVCE) | Service mode input |
| B-8 | DO 5 | General output 5 |
| A-9 | DO 0 | General output 0 |
| B-9 | DO 1 | General output 1 |
| A-10 | DO 2 | General output 2 |
| B-10 | DO 3 | General output 3 |
| A-11 | DO 4 | General output 4 |
| B-11 | END | End normal execution |
| A-12 | BUSY | Executing the command |
| B-12 | READY | Ready for operation |
| A-13 | FG | Frame ground |
| B-13 | FG | Frame ground |
| A-14 | GND | Signal ground |
| B-14 | GND | Signal ground |
| A-15 | NC | Reserved (use inhibited) |
| B-15 | NC | Reserved (use inhibited) |
| A-16 | NC | Reserved (use inhibited) |
| B-16 | NC | Reserved (use inhibited) |
| A-17 | PA+ | Feedback pulse output |
| B-17 | PA- | Feedback pulse output |
| A-18 | PB+ | Feedback pulse output |
| B-18 | PB- | Feedback pulse output |
| A-19 | PZ+ | Feedback pulse output |
| B-19 | PZ- | Feedback pulse output |
| A-20 | NC | Reserved (use inhibited) |
| B-20 | NC | Reserved (use inhibited) |

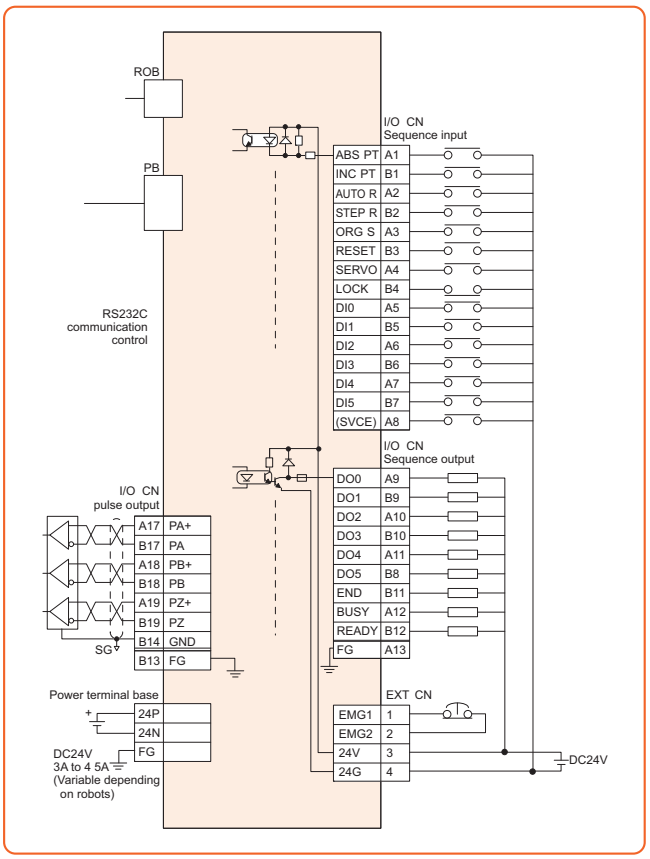
## Pulse train I/O connector signals

| Terminal number | Signal name | Function |
|---|---|---|
| A-1 | NC | Reserved (use inhibited) |
| B-1 | NC | Reserved (use inhibited) |
| A-2 | NC | Reserved (use inhibited) |
| B-2 | PCLR | Differential clear input |
| A-3 | ORG-S | Return to the origin input |
| B-3 | RESET | Alarm reset input |
| A-4 | SERVO | Servo-ON input |
| B-4 | INH | Command pulse inhibition input |
| A-5 | DI 0 | General input 0 |
| B-5 | DI 1 | General input 1 |
| A-6 | DI 2 | General input 2 |
| B-6 | DI 3 | General input 3 |
| A-7 | DI 4 | General input 4 |
| B-7 | DI 5 | General input 5 |
| A-8 | NC | Reserved (use inhibited) |
| B-8 | DO 5 | General output 5 |
| A-9 | DO 0 | General output 0 |
| B-9 | DO 1 | General output 1 |
| A-10 | DO 2 | General output 2 |
| B-10 | DO 3 | General output 3 |
| A-11 | DO 4 | General output 4 |
| B-11 | IN-POS | In-position output |
| A-12 | SRDY | Servo ready output |
| B-12 | ALM | Alarm output |
| A-13 | FG | Frame ground |
| B-13 | FG | Frame ground |
| A-14 | GND | Signal ground |
| B-14 | GND | Signal ground |
| A-15 | PULS+ | Command pulse input |
| B-15 | PULS- | Command pulse input |
| A-16 | DIR+ | Command direction input |
| B-16 | DIR- | Command direction input |
| A-17 | PA+ | Feedback pulse output |
| B-17 | PA- | Feedback pulse output |
| A-18 | PB+ | Feedback pulse output |
| B-18 | PB- | Feedback pulse output |
| A-19 | PZ+ | Feedback pulse output |
| B-19 | PZ- | Feedback pulse output |
| A-20 | NC | Reserved (use inhibited) |
| B-20 | NC | Reserved (use inhibited) |

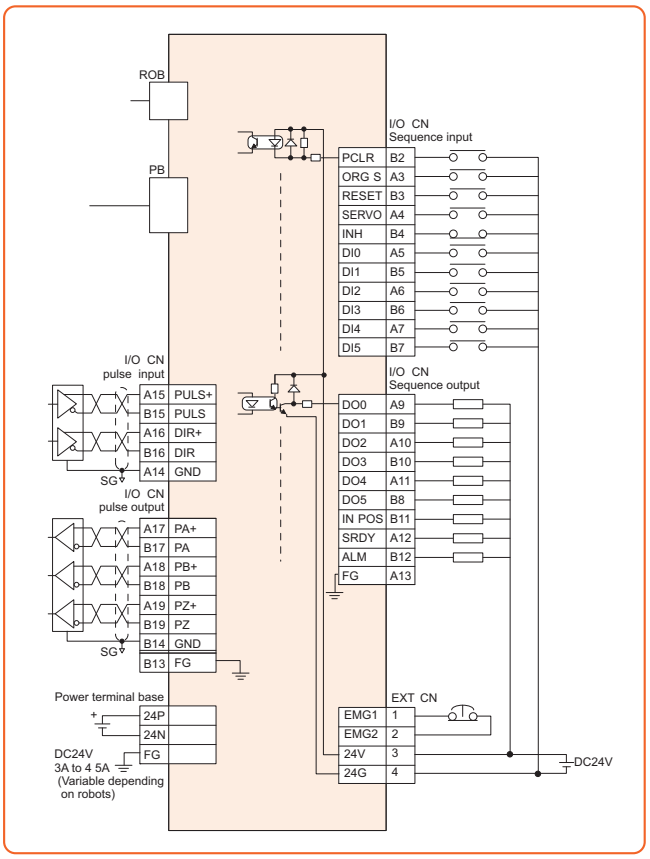
## Pulse train input form

| Logic | Command pulse form | CW direction | CCW direction |
|---|---|---|---|
| Positive logic | Phase A / phase B |  |  |
| | Pulse / code |  |  |
| | CW / CCW |  |  |
| | Phase A / phase B |  |  |
| Negative logic | Pulse / code |  |  |
| | CW / CCW |  |  |

## Input / output wiring diagram




## Pulse train input / output wiring diagram




## Robot Language Table

| Command | Description |
|---|---|
| MOVA | Moves to a point data position. |
| MOVI | Moves from current position by amount of point data. |
| MOVF | Moves until a specified DI input is received. |
| JMP | Jumps to a specified label in the specified program. |
| JMPF | Jumps to a specified label in a specified program according to the input condition. |
| JMPB | Jumps to a specified label when general-purpose input or memory input is in the specified state. |
| L | Defines the jump destination for a JMP or JMPF statement, etc. |
| CALL | Runs another program. |
| DO | Turns general-purpose output or memory output on or off. |
| WAIT | Waits until general-purpose input or memory input is in the specified state. |
| TIMR | Waits the specified amount of time before advancing to the next step. |
| P | Defines point variable. |
| P+ | Adds 1 to point variable. |
| P- | Subtracts 1 from point variable. |
| SRVO | Turns servo on or off. |
| STOP | Temporarily stops program execution. |
| ORGN | Performs return-to-origin. |
| TON | Runs a specified task. |
| TOFF | Stops a specified task. |
| JMPP | Jumps to a specified label when the axis position condition meets the specified conditions. |
| MAT | Defines a matrix. |
| MSEL | Specifies a matrix to move. |
| MOVM | Moves to a specified pallet work position on matrix. |
| JMPC | Jumps to a specified label when the counter array variable C equals the specified value. |
| JMPD | Jumps to a specified label when the counter variable D equals the specified value. |
| CSEL | Specifies an array element for counter array variable C. |
| C | Defines counter array variable C. |
| C+ | Adds a specified value to counter array variable C. |
| C- | Subtracts a specified value from counter array variable C. |
| D | Defines counter variable D. |
| D+ | Adds a specified value to counter variable D. |
| D- | Subtracts a specified value from counter variable D. |
| SHFT | Shifts the coordinate position by amount of specified point data. |
| IN | Stores bit information on specified general-purpose input or memory input into counter variable D. |
| OUT | Outputs the value of counter variable D to specified generalpurpose output or memory output. |
| LET | Assigns the value of a specified variable to another variable. |
| TORQ | Defines the maximum torque command value. |

Single axis

# ERCX

Robot controller  Dedicated T4 / T5 / C4 / C5 / YMS

Extra thin type single-axis controller using 24V DC input power.
Compact and easy to use.

Main functions ▶ P.034

## Features

### 1 Ultra-thin type has 30mm width

ERCX comes in as thin as 30mm thickness using the one-board design.

### 2 Completely absolute

Needs no origin search operation.

### 3 Supports all field networks

Supports CC-link, DeviceNet, Profibus, and Ethernet.

### 4 Multitask function

Simultaneously performs multiple tasks in parallel on robot peripheral equipment, etc.

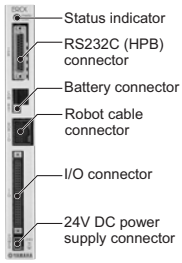
### 5 Function to make conditional stop during movement

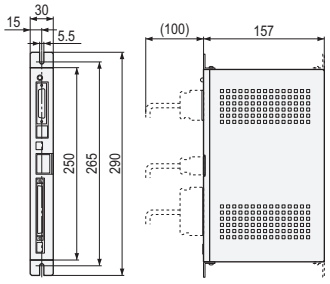
This function is useful when searching the target position with a sensor.

## Model Overview

| Name | ERCX |
|---|---|
| Power | DC24V |
| Operating method | Programming / I/O point tracing / Remote command / Operation using RS-232C communication |
| Maximum number of controllable axes | Single-axis |
| Position detection method | Absolute |
| Controllable robot | Dedicated T4 / T5 / C4 / C5 / YMS |
| Programming box | HPB / HPB-D (with enable switch) P.393 |
| Support software for PC | POPCOM P.391 |

## Part names / dimensions




## Ordering method

**ERCX** – [ ] – [ ] – [ ]

| Controller | Usable for CE | Network Option | Battery |
|---|---|---|---|
| | No entry: Standard | No entry: None | B1: 700mAh |
| | E: CE marking | CC: CC-Link | B2: 2000mAh |
| | | DN: DeviceNet | |
| | | PB: Profibus | |
| | | EN: Ethernet | |

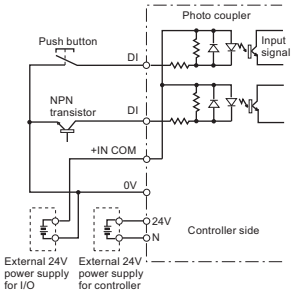
## Basic specifications

| | Item | | Model: ERCX |
|---|---|---|---|
| Basic specifications | Number of controllable axes | | Single-axis |
| | Controllable robots | | Single-axis robot FLIP-X series T4 / T5 / C4 / C5 / YMS |
| | Capacity of the connected motor | | DC24V 30W or less |
| | Dimensions | | W30 × H250 × D157mm |
| | Weight | | Approx. 0.9kg |
| | Input power supply | | DC24V +/-10% or less 3A to 4.5A (Variable depending on robots in use.)Note1 |
| Axis control | Drive method | | AC full-digital software servo |
| | Position detection method | | Multi-turn resolver with data backup function |
| | Operating method | | Programming, I/O point tracing, Remote command, Operation using RS-232C communication |
| | Position indication units | | mm (millimeters) |
| | Speed setting | | 1% to 100% (Setting by 1% unit) |
| | Acceleration setting | | 1. Automatic speed setting per robot No. and payload<br>2. Setting based on acceleration and deceleration parameter (Setting by 1% unit) |
| | Resolution | | 16384 P/rev |
| | Origin search method | | Absolute, Incremental |
| Program | Program language | | YAMAHA SRC |
| | Multitasks | | 4 tasks |
| | Point-data input method | | Manual data input (coordinates input), Direct teaching, Teaching playback |
| Memory | RAM | | 128K bytes with 64K lithium battery backup (5-year life) |
| | Programs | | 100 programs<br>255 steps per program 3000 steps in total |
| | Points | | 1000 points |
| External input/output | I/O | Input | General input 16 points, dedicated input 8 points |
| | | Output | General output 13 points, dedicated output 3 points |
| | | Emergency stop input | Normally closed contact input |
| | Drive power supply | | DC24V from external source within +/-10% Requires a 50mANote2or higher power supply |
| | Brake output | | Relay contact 1CH |
| | External communications | | RS-232C 1CH (For communication with HPB or PC) |
| | Options | Slots | 1 |
| | | Type | CC-Link |
| | | | DeviceNet |
| | | | Profibus |
| | | | Ethernet |
| Options | Programming box | | HPB, HPB-D (with enable switch) |
| | Support software for PC | | POPCOM |
| General specifications | Operating temperature | | 0°C to 40°C |
| | Storage temperature | | -10°C to 65°C |
| | Operating humidity | | 35% to 85%RH (non-condensing) |
| | Ni-Cd battery charging method | | Trickle charging |
| | Noise immunity | | Conforms to IEC61000-4-4 Level 2 |

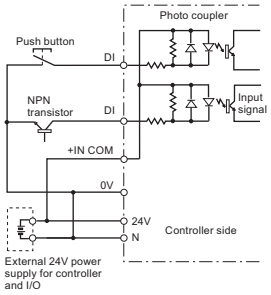
Note 1. When controlling a brake and I/O operations, a separate 24V power supply with the necessary capacity must be connected to the I/O connectors. A 24V power supply with higher capacity can boost robot performance. Please consult us for more details.
Note 2. When no brake and I/O control are used. If a brake and I/O control are used, an additional power supply with the necessary capacity will be required.

## Example of input signal connection

**●When using 24V power supply dedicated for I/O**



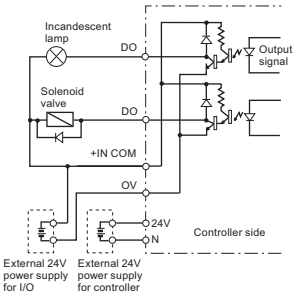

**●When using 24V power supply for controller as well**



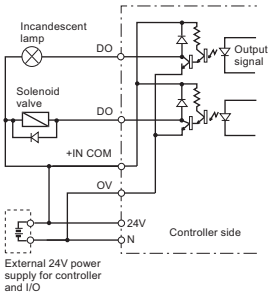

Note : When sharing the power supply, pay special attention to the power supply capacity.

## Example of output signal connection

**●When using 24V power supply dedicated for I/O**




**●When using 24V power supply for controller as well**




Note : When sharing the power supply, pay special attention to the power supply capacity.

## Connector I/O signals

| Terminal number | Signal name | Function |
|---|---|---|
| A-1 | ABS-PT | Move the point from the origin position |
| B-1 | INC-PT | Move the point from the current position |
| A-2 | AUTO-R | Start automatic operation |
| B-2 | STEP-R | Start step operation |
| A-3 | ORG-S | Return to the origin |
| B-3 | RESET | Reset |
| A-4 | SERVO | Return to servo on |
| B-4 | LOCK | Interlock |
| A-5 | DI 0 | General input 0 |
| B-5 | DI 1 | General input 1 |
| A-6 | DI 2 | General input 2 |
| B-6 | DI 3 | General input 3 |
| A-7 | DI 4 | General input 4 |
| B-7 | DI 5 | General input 5 |
| A-8 | DI 6 | General input 6 |
| B-8 | DI 7 | General input 7 |
| A-9 | DI 8 | General input 8 |
| B-9 | DI 9 | General input 9 |
| A-10 | DI 10 | General input 10 |
| B-10 | DI 11 | General input 11 |
| A-11 | DI 12 | General input 12 |
| B-11 | DI 13 | General input 13 |
| A-12 | DI 14 | General input 14 |
| B-12 | DI 15 | General input 15 |
| A-13 | +IN COM | Controller external+24V power input |
| B-13 | +IN COM | Controller external+24V power input |
| A-14 | RESERVE | Use by the user prohibited |
| B-14 | RESERVE | Use by the user prohibited |
| A-15 | 0V | Input/output standard 0V |
| B-15 | 0V | Input/output standard 0V |
| A-16 | DO 0 | General output 0 |
| B-16 | DO 1 | General output 1 |
| A-17 | DO 2 | General output 2 |
| B-17 | DO 3 | General output 3 |
| A-18 | DO 4 | General output 4 |
| B-18 | END | End normal execution |
| A-19 | BUSY | Executing the command |
| B-19 | READY | Ready for operation |
| A-20 | DO 5 | General output 5 |
| B-20 | DO 6 | General output 6 |
| A-21 | DO 7 | General output 7 |
| B-21 | DO 8 | General output 8 |
| A-22 | DO 9 | General output 9 |
| B-22 | DO 10 | General output 10 |
| A-23 | DO 11 | General output 11 |
| B-23 | DO 12 | General output 12 |
| A-24 | ENG 1 | Emergency stop input 1, used with EMG2 as a pair |
| B-24 | ENG 2 | Emergency stop input 2, used with EMG1 as a pair |

## Robot Language Table

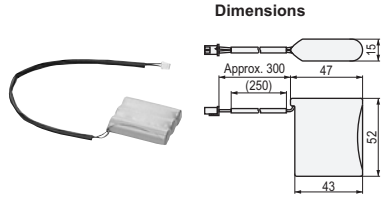
| Command | Description |
|---|---|
| MOVA | Moves to a point data position. |
| MOVI | Moves from current position by amount of point data. |
| MOVF | Moves until a specified DI input is received. |
| JMP | Jumps to a specified label in the specified program. |
| JMPF | Jumps to a specified label in a specified program according to the input condition. |
| JMPB | Jumps to a specified label when general-purpose input or memory input is in the specified state. |
| L | Defines the jump destination for a JMP or JMPF statement, etc. |
| CALL | Runs another program. |
| DO | Turns general-purpose output or memory output on and off. |
| WAIT | Waits until general-purpose input or memory input is set in the specified state. |
| TIMR | Waits the specified amount of time before advancing to the next step. |
| P | Defines point variable. |
| P+ | Adds 1 to a point variable. |
| P- | Subtracts 1 from a point variable. |
| SRVO | Turns a servo on and off. |
| STOP | Temporarily stops program execution. |
| ORGN | Performs return-to-origin. |
| TON | Runs a specified task. |
| TOFF | Stops a specified task. |
| JMPP | Jumps to a specified label when the axis position relation meets the specified conditions. |
| MAT | Defines a matrix. |
| MSEL | Specifies a matrix to move. |
| MOVM | Moves to a specified pallet work position on matrix. |
| JMPC | Jumps to a specified label when counter array variable C equals the specified value. |
| JMPD | Jumps to a specified label when counter variable D equals the specified value. |
| CSEL | Specifies the array element for counter array variable C. |
| C | Defines counter array variable C. |
| C+ | Adds a specified value to counter array variable C. |
| C- | Subtracts a specified value from counter array variable C. |
| D | Defines counter variable D. |
| D+ | Adds a specified value to counter variable D. |
| D- | Subtracts a specified value from counter variable D. |
| SHFT | Shifts the coordinate position by a distance equal to specified point data. |

## Absolute battery B1 / B2

These batteries are for backing up the absolute data. B1 and B2 differ in the capacity. Select either one to be suitable for equipment stop time. (Select from either B1 or B2 when ordering.)

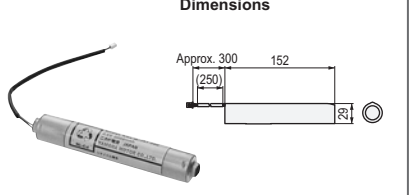
### B1 battery

Dimensions




### B2 battery

Dimensions




### Battery B1 / B2 basic specifications

| Item | B1 | B2 |
|---|---|---|
| Model | KR4-M4252-10 | KR4-M4252-00 |
| Battery type | Ni-Cd battery | |
| Battery capacity | 3.6V/700mAh | 3.6V/2,000mAh |
| Data holding time[Note] | 120 hours | 340 hours |
| Dimensions | W52 × D47 × H15mm | ϕ29 × L152mm |
| Weight | 80g | 280g |
| Cable length | 300mm | 300mm |

Note. When power is turned OFF with fully charged battery mounted.

## Standard accessories

### Power connector

| Model | KR4-M4875-00 |
|---|---|

### I/O connector

| Model | KR4-M4421-00 |
|---|---|

## Options

### I/O checker

With this checker, not only input and output status can be checked by LEDs but also the input signal can be simulated with the toggle switch.

| Model | KD1-M4530-01 |
|---|---|

Single axis

# SR1-X/SR1-P

**Robot controller with advanced functions**

Compact design with high performance.
Although with one axis,
functions of upper class controllers.

SR1-X SR1-P

Main functions ▶ P.035

## Features

### 1 Support most operating method

Supports diverse operating methods including program operation, point trace, and movement to specified coordinates, etc.

### 2 Position data hold time: 1 year

The absolute position data hold time which was only 2 weeks, has now been drastically increased to about 1 year.

### 3 I/O assignment Change

Changing the I/O assignment allows selecting operations such as program operation, point trace, point teaching, and trace operation by specifying coordinates. Jog operation can also be performed from the upstream device.

### 4 Use of two power supplies

Isolating into main power supply and control power supply yields an even higher degree of safety. It also makes servicing easier when an alarm occurs.

### 5 Current position output function

These controllers can output the current position as feedback pulse or binary data. This allows the upstream device to know the robot position in real-time.

### 6 Torque limiting

This function limits the maximum torque value to an optional timing. These controllers offer 2 types of torque limiting: limiting the torque by using parameter data, and limiting torque by using analog input voltages.

### 7 Various monitor functions

Offers monitor functions of different types including input/output status monitoring, duty monitoring, and analog monitoring, etc.

## Model Overview

| Name | SR1-X | SR1-P |
|---|---|---|
| Power | 05 / 10 driver<br>Single phase 100 to 115V/200 to 230V +/-10% maximum (50/60Hz) | 20 driver<br>Single phase 200 to 230V +/-10% maximum (50/60Hz) |
| Operating method | Programming / I/O point tracing / Remote command / Operation using RS-232C communication | |
| Maximum number of controllable axes | Single-axis | |
| Position detection method | Absolute / Incremental | Incremental / Semi-absolute |
| Controllable robot | Single-axis robot FLIP-X | Linear motor single-axis robot PHASER |
| Programming box | HPB / HPB-D (with enable switch) P.393 | |
| Support software for PC | POPCOM P.391 | |

## Ordering method

SR1-X

**SR1-X** - [ ] - [ ] - [ ] - [ ] - [ ]

| Controller | Driver | Usable for CE | Regenerative unit Note1 | Input/Output Selection | Battery |
|---|---|---|---|---|---|
| | 05: 100W or less<br>10: 200W<br>20: 400 to 600W | No entry: Standard<br>E: CE marking | No entry: None<br>R: RG1 | N: NPN<br>P: PNP<br>CC: CC-Link<br>DN: DeviceNet<br>PB: Profibus<br>YC: YC-Link No e2 | No entry: None (Incremental specification)<br>B: Battery (Absolute specification) |

Note 1. Driver selection and regenerative unit selection depends on the robot type. See the selection table on the next page for selecting the driver/regenerative circuit.
Note 2. Available only for the slave.

SR1-P

**SR1-P** - [ ] - [ ] - [ ] - [ ]

| Controller | Driver | Usable for CE | Regenerative unit Note1 | Input/Output Selection |
|---|---|---|---|---|
| | 05: 100W or less<br>10: 200W<br>20: 400 to 600W | No entry: Standard<br>E: CE marking | No entry: None<br>R: RG1 | N: NPN<br>P: PNP<br>CC: CC-Link<br>DN: DeviceNet<br>PB: Profibus<br>YC: YC-Link No e2 |

Note 1. Driver selection and regenerative unit selection depends on the robot type. See the selection table on the next page for selecting the driver/regenerative circuit.
Note 2. Available only for the slave.

# SR1-X/SR1-P

## Driver / regenerative unit selection table

### SR1-X

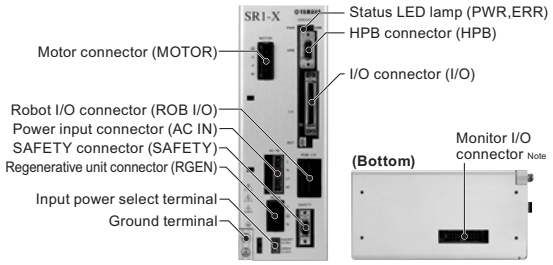
| | | | FLIP-X | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | T4H/ C4H | T5H/ C5H | T6/C6 | T9 | T9H | F8/C8 | F8L/ C8L | F8LH/ C8LH | F10 | F14/ C14 | F14H/ C14H | F17/ C17 | F17L/ C17L | F20/ C20 | F20N | N15/ N15D | N18/ N18D | B10 | B14 | B14H | R5 | R10 | R20 |
| Driver selection | SR1-X | 05 | ● | ● | ● | ● | | ● | ● | ● | ● | ● | | | | | | | | ● | ● | ● | ● | ● | |
| | | 10 | | | | | ● | | | | | | ● | | | | | | | | | | | | ● |
| | | 20 | | | | | | | | | | | | ● | ● | ● | ● | ● | ● | | | | | | |
| Regenerative unit | No entry (None) | | ● | ● | ● | (1) | (2) | ● | ● | ● | (1) | (1) | (2) | (3) | | (3) | (4) | | | ● | ● | (5) | ● | ● | ● |
| | R (RG1) | | | | | (1) | (2) | | | | (1) | (1) | (2) | (3) | ● | (3) | (4) | ● | ● | | | (5) | | | |

**(1)** Regenerative unit is needed if using in a perpendicular position and movement stroke is 700mm or more.
**(2)** Regenerative unit is needed if using in a perpendicular position.
**(3)** Regenerative unit is needed if using in a perpendicular position, using at maximum speeds exceeding 1000mm per second, or if using high leads (40).
**(4)** Regenerative unit is needed if using at maximum speeds exceeding 1000mm per second.
**(5)** Regenerative unit is needed if using at maximum speeds exceeding 1250mm per second.

### SR1-P

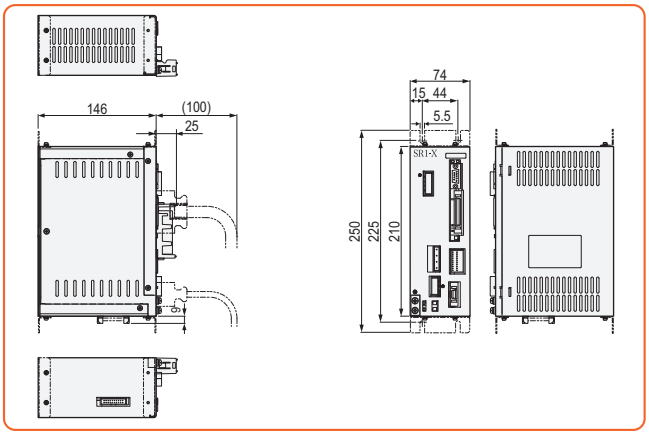
| | | | PHASER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | MR12/ MR12D | MR16/ MR16D | MR16H/ MR16HD | MR20/ MR20D | MR25/ MR25D | MF15/ MF15D | MF20/ MF20D | MF30/ MF30D | MF50/ MF50D |
| Driver selection | SR1-P | 05 | ● | ● | | | | | | | |
| | | 10 | | | ● | | ● | ● | ● | | |
| | | 20 | | | | ● | | | | ● | ● |
| Regenerative unit | No entry (None) | | ● | ● | ● | ● | ● | ● | | | |
| | R (RG1) | | | | | | | | ● | ● | ● |

## SR1-X / SR1-P part names

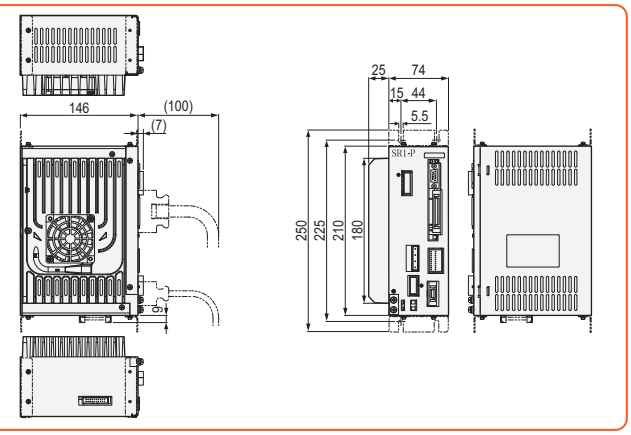



Note. Cable for monitor I/O (option) is required when using this connector.

## SR1-X / SR1-P 05 · 10 dimensions



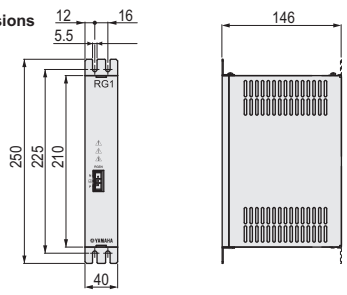

## SR1-X / SR1-P 20 dimensions




## Regenerative unit RG1

### Regenerative unit RG1

Dimensions




### Basic specifications

| Item | RG1 |
|---|---|
| Model | KBG-M4107-0A (Including accessory) |
| Dimensions | W40 × H210 × D146mm |
| Weight | 0.8kg |
| Regenerative voltage | Approx. 380V or more |
| Regenerative stop voltage | Approx. 360V or less |
| Accessory | Cable for connection with controller (300mm) |

Note. Always leave an empty space (gap of about 20mm) between this unit and the adjacent controller. Also, always use the dedicated cable when connecting the controller.

## Basic specifications

| | Item | | Model | SR1-X | | | SR1-P | | |
|---|---|---|---|---|---|---|---|---|---|
| Basic specifications | Driver model | | | SR1-X-05 | SR1-X-10 | SR1-X-20 | SR1-P-05 | SR1-P-10 | SR1-P-20 |
| | Applicable motor output | | | 200V 100W | 200V 200W | 200V 600W | 200V 100W | 200V 200W | 200V 600W |
| | Number of controllable axes | | | Single-axis | | | | | |
| | Controllable robots | | | Single-axis robot FLIP-X (exclude T4, T5) | | | Linear motor single-axis robot PHASER (exclude MF100) | | |
| | Maximum power consumption | | | 400VA | 600VA | 1400VA | 400VA | 600VA | 1400VA |
| | Capacity of the connected motor | | | 100W | 200W | 600W | 100W | 200W | 600W |
| | Dimensions | | | W74 × H210 × D146mm | | W99 × H210 × D146mm | W74 × H210 × D146mm | | W99 × H210 × D146mm |
| | Weight | | | 1.54kg | | 1.92kg | 1.54kg | | 1.92kg |
| | Input power supply | Control power supply | | Single phase AC100 to 115/200V+/-10% maximum 50/60Hz | | | | | |
| | | Motor power supply | | Single phase AC100 to 115/200V +/-10% maximum 50/60Hz | | Single phase AC200 to 230V +/-10% maximum 50/60Hz | Single phase AC100 to 115/200V +/-10% maximum 50/60Hz | | Single phase AC200 to 230V +/-10% maximum 50/60Hz |
| Axis control | Drive method | | | AC full-digital software servo | | | | | |
| | Position detection method | | | Multi-turn resolver with data backup function | | | Magnetic linear scale | | |
| | Operating method | | | Programming, I/O point tracing, Remote command, Operation using RS-232C communication | | | | | |
| | Position indication units | | | mm (millimeters), deg (degrees) | | | | | |
| | Speed setting | | | 1% to 100% (Setting by 1% unit) | | | | | |
| | Acceleration setting | | | 1. Automatic speed setting per robot No. and payload<br>2. Setting based on acceleration and deceleration parameter (Setting by 1% unit) | | | | | |
| | Resolution | | | 16384 P/rev | | | 1μm | | |
| | Origin search method | | | Absolute, Incremental | | | Incremental, Semi-absolute | | |
| Program | Program language | | | YAMAHA SRC | | | | | |
| | Multitasks | | | 4 tasks maximum | | | | | |
| | Point-data input method | | | Manual data input (coordinate value input), Direct teaching, Teaching playback | | | | | |
| Memory | Programs | | | 100 programs<br>255 steps / 1 programs 3000 steps / total | | | | | |
| | Points | | | 1000 points | | | | | |
| External input/output | STD.DIO | I/O input | | Dedicated input 8 points, General input16 points | | | | | |
| | | I/O output | | Dedicated Output4 points, General output16 points | | | | | |
| | SAFETY | | | Emergency stop input (Normal close contact point input), service mode input | | | | | |
| | Brake output | | | Relay contact | | | – | | |
| | Origin sensor input | | | Connectable to DC 24V normally-closed contact sensor | | | | | |
| | External communications | | | RS-232C: 1CH (For communication with HPB / HPB-D or PC) | | | | | |
| | Analog input/output | | | Input 1ch (0 to +10V) Output 2ch (0 to +10V) | | | | | |
| | Options | Slots | | 1 | | | | | |
| | | Type | | NPN/PNP: Dedicated input 8 points, Dedicated Output 4 points, General input 16 points, General output 16 points | | | | | |
| | | | | CC-Link: Dedicated input 16 points, Dedicated Output 16 points, General input 32 points, General output 32 points | | | | | |
| | | | | DeviceNet: Dedicated input 16 points, Dedicated Output 16 points, General input 32 points, General output 32 points | | | | | |
| | | | | PROFIBUS: Dedicated input 16 points, Dedicated Output 16 points, General input 32 points, General output 32 points | | | | | |
| Options | Programming box | | | HPB, HPB-D (with enable switch) | | | | | |
| | Support software for PC | | | POPCOM | | | | | |
| General specifications | Operating temperature | | | 0°C to 40°C | | | | | |
| | Storage temperature | | | -10°C to 65°C | | | | | |
| | Operating humidity | | | 35% to 85%RH (non-condensing) | | | | | |
| | Absolute backup battery | | | Lithium metallic battery | | | – | | |
| | Absolute data backup period | | | 1 year (in state with no power applied) | | | – | | |
| | Noise immunity | | | IEC61000-4-4 Level 3 | | | | | |

## [NPN, PNP type] Input/Output list

| Terminal number | Signal name | Function |
|---|---|---|
| 1 | DI.+COM | Input supply+common |
| 2 | SERVO | Return to servo on |
| 3 | INC-PT | Relative point transfer |
| 4 | ABS-PT | Absolute point transfer |
| 5 | STEP-R | Step run |
| 6 | DI 0 | General input 0 |
| 7 | DI 1 | General input 1 |
| 8 | DI 2 | General input 2 |
| 9 | DI 3 | General input 3 |
| 10 | DI 4 | General input 4 |
| 11 | DI 5 | General input 5 |
| 12 | DI 6 | General input 6 |
| 13 | DI 7 | General input 7 |
| 14 | DO.+COM | Output supply+common |
| 15 | DO.+COM | Output supply+common |
| 16 | END | Execution result (Execution complete) |
| 17 | BUSY | Executing the command |
| 18 | DO 0 | General output 0 |
| 19 | DO 1 | General output 1 |
| 20 | DO 2 | General output 2 |
| 21 | DO 3 | General output 3 |
| 22 | DO 4 | General output 4 |
| 23 | DO 5 | General output 5 |
| 24 | DO 6 | General output 6 |
| 25 | DO 7 | General output 7 |
| 26 | DI.-COM | Input supply-common |
| 27 | AUTO-R | Auto run |
| 28 | RESET | Reset |
| 29 | ORG-S | Return to the origin |
| 30 | ALMRST | Alarm reset |
| 31 | DI 8 | General input 8 |
| 32 | DI 9 | General input 9 |
| 33 | DI 10 | General input 10 |
| 34 | DI 11 | General input 11 |
| 35 | DI 12 | General input 12 |
| 36 | DI 13 | General input 13 |
| 37 | DI 14 | General input 14 |
| 38 | DI 15 | General input 15 |
| 39 | DO.-COM | Output supply-common |
| 40 | DO.-COM | Output supply-common |
| 41 | READY | Available to operate (Ready for operation) |
| 42 | UTL | Utility output |
| 43 | DO 8 | General output 8 |
| 44 | DO 9 | General output 9 |
| 45 | DO 10 | General output 10 |
| 46 | DO 11 | General output 11 |
| 47 | DO 12 | General output 12 |
| 48 | DO 13 | General output 13 |
| 49 | DO 14 | General output 14 |
| 50 | DO 15 | General output 15 |

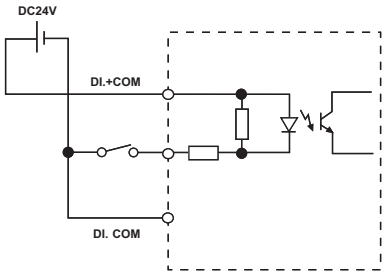
## SAFETY connector signals

| Terminal number | Signal name | Meaning |
|---|---|---|
| 1 | DI.COM | Input supply common |
| 2 | LOCK | Interlock |
| 3 | SVCE | SERVICE mode |
| 4 | DO.COM | Output supply common |
| 5 | MPRDY | Main power ready |
| 6 | NC | NC |
| 7 | NC | NC |
| 8 | NC | NC |
| 9 | NC | NC |
| 10 | NC | NC |
| 11 | EMG1 | Emergency stop 1 |
| 12 | EMG2 | Emergency stop 2 |
| 13 | NC | NC |
| 14 | NC | NC |

## NPN type input/output circuit

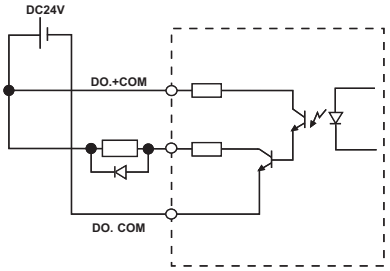
### Input circuit

- Form : DC input (positive common type)
  Photo coupler insulation type
- Input power supply : 5mA/point
- Answering time : 30ms or less




### Output circuit

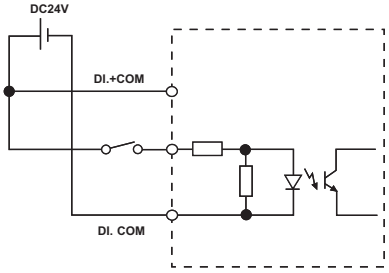
- Form : NPN open collector output (negative common type)
  Photo coupler insulation type
- Load : 50mA/point
- Answering time : 1ms or less




## PNP type input/output circuit

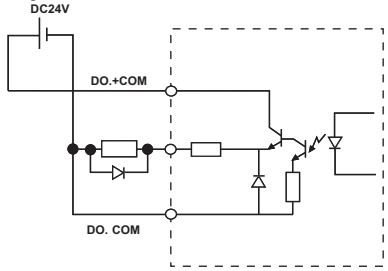
### Input circuit

- Form : DC input (negative common type)
  Photo coupler insulation type
- Input power supply : 5mA/point
- Answering time : 30ms or less




### Output circuit

- Form : PNP open collector output (positive common type)
  Photo coupler insulation type
- Load : 50mA/point
- Answering time : 1ms or less



## Robot Language Table

| Command | Description |
|---|---|
| MOVA | Moves to a point data position. |
| MOVI | Moves from current position by amount of point data. |
| MOVF | Moves until a specified DI input is received. |
| JMP | Jumps to a specified label in the specified program. |
| JMPF | Jumps to a specified label in a specified program according to the input condition. |
| JMPB | Jumps to a specified label in a specified program when general-purpose input or memory input is in the specified state. |
| L | Defines the jump destination for a JMP or JMPF statement. |
| CALL | Runs another program. |
| DO | Turns general-purpose output or memory output on or off. |
| WAIT | Waits until general-purpose input or memory input is in the specified state. |
| TIMR | Waits the specified amount of time before advancing to the next step. |
| P | Defines point variable. |
| P+ | Adds 1 to point variable. |
| P- | Subtracts 1 from point variable. |
| SRVO | Turns servo on or off. |
| STOP | Temporarily stops program execution. |
| ORGN | Performs return-to-origin. |
| TON | Runs a specified task. |
| TOFF | Stops a specified task. |
| JMPP | Jumps to a specified label when the axis position condition meets the specified conditions. |
| MAT | Defines a matrix. |
| MSEL | Specifies a matrix to move. |
| MOVM | Moves to a specified pallet work position on matrix. |
| JMPC | Jumps to a specified label when the counter array variable C equals the specified value. |
| JMPD | Jumps to a specified label when the counter variable D equals the specified value. |
| CSEL | Specifies an array element for counter array variable C. |
| C | Defines counter array variable C. |
| C+ | Adds a specified value to counter array variable C. |
| C- | Subtracts a specified value from counter array variable C. |
| D | Defines counter variable D. |
| D+ | Adds a specified value to counter variable D. |
| D- | Subtracts a specified value from counter variable D. |
| SHFT | Shifts the coordinate position by amount of specified point data. |
| IN | Stores bit information on specified general-purpose input or memory input into counter variable D. |
| OUT | Outputs the value of counter variable D to specified general-purpose output or memory output. |
| LET | Shifts the coordinate position by amount of specified point data. |

# Accessories and part options

## Standard accessories

### Power connector + wiring connection lever

| Model | KAS-M5382-00 |
|---|---|

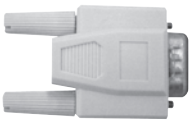
Note. Jointly used by RCX221 / 222, RCX240.

### Safety connector

| Connector plug model | KBG-M4424-00 |
|---|---|
| Connector cover model | KBG-M4425-00 |

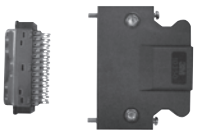
### HPB dummy connector

Attach this to the HPB connector during operation with the programming box HPB removed.



| Model | KBG-M5163-00 |
|---|---|

### NPN / PNP connector



| Connector plug model | KBH-M4424-00 |
|---|---|
| Connector cover model | KBH-M4425-00 |

Note. Jointly used by RCX221 / 222.

### L type stay

Use to install the controller.

| Model | KBG-M410H-00 |
|---|---|

### Battery case

This is the absolute battery holder.

| Model | KBG-M5395-00 |
|---|---|

### Absolute battery (only for SR1-X)

Battery for absolute data back-up.

Absolute battery basic specifications

| Item | Absolute battery |
|---|---|
| Model | KAS-M53G0-10 |
| Battery type | Lithium metallic battery |
| Battery capacity | 3.6V/2,700mAh |
| Data holding time | 1 year Note1 |
| Dimensions | ϕ17 × L53mm |
| Weight Note2 | 22g |

Note1. When using 2 batteries. Note2. Weight of battery itself.
Note. Jointly used by RCX222, RCX240.

## Options

### Cable for monitor I/O

Cable to connect I/O connector of SR1 monitor. The cable is 1.5m long with its end cut and left as it is.

Required when using analog input / output and feedback pulse output.

| Model | KBG-M4421-00 |
|---|---|

### PC support software POPCOM

POPCOM is a simple to use application software that makes tasks such as robot operation, writing-editing programs, and point teaching easy to visually understand.

| POPCOM software model | KR4-M4966-00 |
|---|---|

Note. Use POPCOM with Version 1.13.0 or later when using SR1-P / SR1-X.

| Data cable (9Pin-9Pin) 5m | KAS-M538F-10 |
|---|---|

Note. Data cable jointly used for POPCOM, VIP, VIP+.

### Programming box HPB / HPB-D

This device can perform all operations such as manual robot operation, program entry and edit, teaching and parameter settings.

| | HPB | HPB-D |
|---|---|---|
| Model | KBB-M5110-01 | KBB-M5110-21 |
| Enable switch | – | 3-position |
| CE marking | Not supported | Applicable |

P.393

### Environment

| | |
|---|---|
| OS | Microsoft Windows 3.1/95/98/Me/NT/2000/XP<br>Note. The 64 bit version is not subject to the operation warranty. |
| CPU | Exceeding the environment recommended by the OS being used |
| Memory | Exceeding the environment recommended by the OS being used |
| Hard disk | Vacant capacity of more than 4MB in the installation destination drive |
| Disk operation | CD-ROM drive |
| Applicable controllers | ERCD / ERCX / SR1-P / SR1-X / SRCP30 / DRCX |

Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.

P.391

Note. Use the converter cable if changing to the SR1-X, SR1-P from a system using SRCX, SRCP. (See P.427).

Single axis

# SRCP30

Robot controller  Dedicated MF100

By adding the pulse train function,
it becomes easier to operate.
SRCP30 is a high-performance controller for MF100.

Main functions ▶ P.036

## Features

**1 PHASER series MF100 dedicated controller.**

**2 Supports 3 operating methods: pulse train, program, and point trace.**

**3 Large data capacity allows running up to 4 multitasks at once by program.**

**4 Supports CC-link, DeviceNet, Profibus, and Ethernet.**

### Model Overview

| Name | SRCP30 |
|---|---|
| Power | Main power supply: 3-phase AC200V to 230V<br>Control power supply: Single phase AC200V to 230V |
| Operating method | Pulse train control / Programming / I/O point tracing / Remote command / Operation using RS-232C communication |
| Maximum number of controllable axes | Single-axis |
| Position detection method | Incremental |
| Controllable robot | Dedicated MF100 |
| Programming box | HPB / HPB-D (with enable switch) P.393 |
| Support software for PC | POPCOM P.391 |

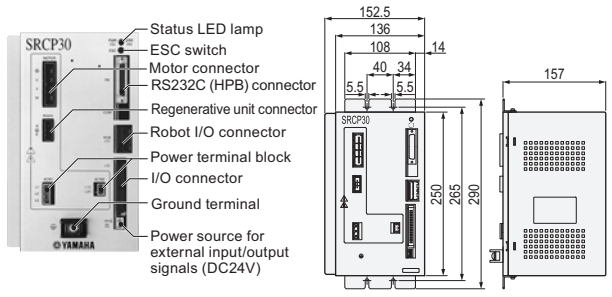
### Ordering method

**SRCP30 - R3 - [ ] - [ ]**

| Controller | Regenerative unit | Network Option | I/O connector specification |
|---|---|---|---|
| SRCP30 | R3: RGU-3 Note 1 | No entry: None | CN1: I/Oflat cable 1m (Standard) |
| | | CC: CC-Link | CN2: Twisted-paircable 2m |
| | | DN: DeviceNet | |
| | | PB: Profibus | |
| | | EN: Ethernet | |

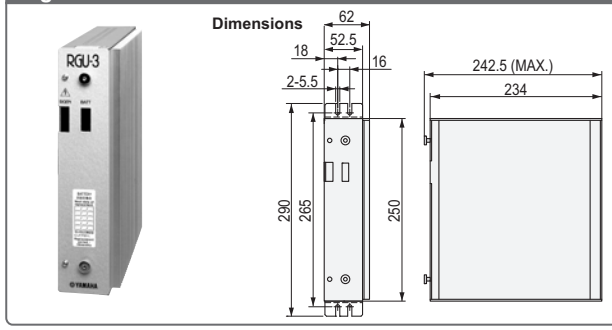
Note 1. Requires the regenerative unit RGU-3.

### Part names / dimensions




### Regenerative unit RGU-3 dimensions

**Regenerative unit RGU-3**




### Regenerative unit RGU-3 basic specifications

| Item | RGU-3 (for SRCP30) |
|---|---|
| Model | KBD-M4107-0A (Including accessory) |
| Dimensions | W62 × H250 × D242.5mm |
| Weight | 3.7kg |
| Regenerative voltage | Approx. 380V or more |
| Regenerative stop voltage | Approx. 360V or less |
| Accessory | Cable for connection with controller (300mm) |

Note. Always leave an empty space (gap of about 20mm) between this unit and the adjacent controller. Also, always use the dedicated cable when connecting the controller.

# SRCP30

## Basic specifications

| Item | | | | Model | SRCP30 |
|---|---|---|---|---|---|
| Basic specifications | Number of controllable axes | | | | Single-axis |
| | Controllable robots | | | | Dedicated MF100 |
| | Maximum power consumption | | | | 2500VA |
| | Dimensions | | | | W152.5 × H250 × D157mm |
| | Weight | | | | 3.5kg |
| | Input power supply | | | | Main power supply: 3-phase AC200 to 230V+/-10% maximum 50/60Hz |
| | | | | | Control power supply: Single phase AC200 to 230V+/-10% maximum 50/60Hz |
| Axis control | Drive method | | | | AC full-digital software servo |
| | Position detection method | | | | Magnetic linear scale |
| | Operating method | | | | Pulse train control, Programming, I/O point tracing, Remote command, Operation using RS-232C communication |
| | Position indication units | | | | mm (millimeters) |
| | Speed setting | | | | 1% to 100% (Setting by 1% unit, changeable in the program) |
| | Acceleration setting | | | | 1. Automatic speed setting per robot No. and payload<br>2. Setting based on acceleration and deceleration parameter (Setting by 1% unit) |
| | Resolution | | | | 1μm |
| | Origin search method | | | | Incremental |
| Program | Program language | | | | YAMAHA SRC |
| | Multitasks | | | | 4 tasks |
| | Point-data input method | | | | Manual data input (coordinate value input), Direct teaching, Teaching playback |
| Memory | RAM | | | | 128KB With lithium battery backup (5-year life) Programs, points, parameter and error histories retained |
| | Programs | | | | 100 programs<br>3000 steps / total or less in total, 255 steps / program |
| | Points | | | | 1000 points (256 when point tracing) |
| Command form | I/O | Normal mode | | | Robot operated by dedicated command input |
| | | Pulse train mode | Type | | One of 3 types (1. Phase A/phase B 2. Pulse/code 3. CW/CCW) selected |
| | | | Mode | | Line driver (+5V) |
| | | | Frequency | | 2 Mpps at max. (Line driver) |
| | Serial communication (RS-232C) | | | | 1. Data transmit / receive, parameter setting, robot operation by communication commands<br>2. Data transmit / receive, parameter setting, point teaching, robot operation by HPB |
| External input/output | I/O interface | Normal mode Note1 | Sequence input | | General input 8 points, dedicated input 8 points |
| | | | Sequence output | | General output 5 points, dedicated output 3 points Open collector output |
| | | Pulse train mode Note1 | Sequence input | | General input 8 points, dedicated input 5 points |
| | | | Sequence output | | General output 5 points, dedicated output 3 points Open collector output |
| | | | Command pulse input | Name | PLUS+, PLUS-, DIR+, DIR- |
| | | | | Type | One of above types selected |
| | | | | Form | Line driver (+5V) |
| | | | Feedback pulse output | Name | PA+, PA-, PB+, PB-, PZ+, PZ-, PZM+, PZM- |
| | | | | Type | Phase A / phase B / phase Z |
| | | | | Form | Line driver (+5V) |
| | | | | Pulse count | 1 pulse/μm |
| | | Power supply for sequence I/O | | | DC+24V external input for sequence input/output |
| | Emergency stop input | | | | Normally-closed contact input (origin return not required after emergency stop is released) |
| | Origin sensor input | | | | Connectable to DC 24V normally-closed contact sensor<br>Dedicated power supply for sequence (I/O) input/output |
| | External communications | | | | RS-232C 1CH (For communication with HPB or PC) |
| | Options | Slots | | | 1 |
| | | Type | | | CC-Link / DeviceNet / Profibus / Ethernet |
| Options | Programming box | | | | HPB, HPB-D (with enable switch) |
| | Support software for PC | | | | POPCOM |
| General specifications | Operating temperature | | | | 0°C to 40°C |
| | Storage temperature | | | | 10°C to 65°C |
| | Operating humidity | | | | 35% to 85%RH (non-condensing) |
| | Noise resistance capacity | | | | IEC61000-4-4 level 2 |
| | Protective functions | | | | Detection of excessive current, overload, disconnection, incorrect operation |

Note 1. Switching between the normal mode and pulse train mode is done by use of the parameter.

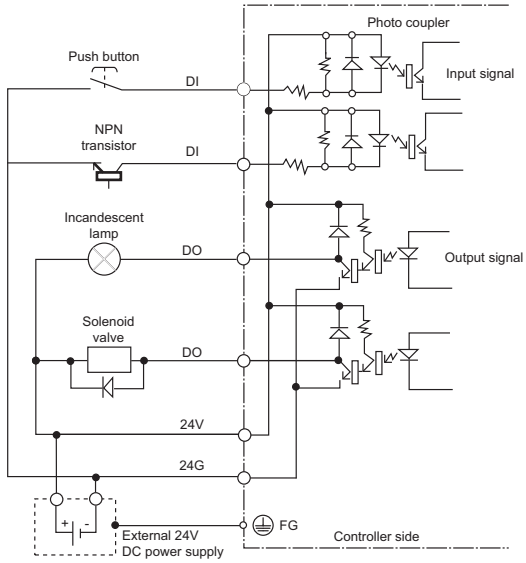
## Connector I/O signals

| Terminal number | Signal name | Function |
|---|---|---|
| A-1 | ABS-PT | Move the point from the origin position |
| B-1 | INC-PT | Move the point from the current position |
| A-2 | AUTO-R | Start automatic operation |
| B-2 | STEP-R | Start step operation |
| A-3 | ORG-S | Return to the origin |
| B-3 | RESET | Reset |
| A-4 | SERVO | Return to servo on |
| B-4 | LOCK | Interlock |
| A-5 | DI 0 | General input 0 |
| B-5 | DI 1 | General input 1 |
| A-6 | DI 2 | General input 2 |
| B-6 | DI 3 | General input 3 |
| A-7 | DI 4 | General input 4 |
| B-7 | DI 5 | General input 5 |
| A-8 | DI 6 | General input 6 |
| B-8 | DI 7/SVCE | General input 7 / Service mode input |
| A-9 | DO 0 | General output 0 |
| B-9 | DO 1 | General output 1 |
| A-10 | DO 2 | General output 2 |
| B-10 | DO 3 | General output 3 |
| A-11 | DO 4 | General output 4 |
| B-11 | END | End normal execution |
| A-12 | BUSY | Executing the command |
| B-12 | READY | Ready for operation (Alarm) |
| A-13 | FG | Frame ground |
| B-13 | FG | Frame ground |
| A-14 | NC | Reserved (use inhibited) |
| B-14 | NC | Reserved (use inhibited) |
| A-15 | NC | Reserved (use inhibited) |
| B-15 | NC | Reserved (use inhibited) |
| A-16 | NC | Reserved (use inhibited) |
| B-16 | NC | Reserved (use inhibited) |
| A-17 | PA+ | Feedback pulse output |
| B-17 | PA- | Feedback pulse output |
| A-18 | PB+ | Feedback pulse output |
| B-18 | PB- | Feedback pulse output |
| A-19 | PZ+ | Feedback pulse output |
| B-19 | PZ- | Feedback pulse output |
| A-20 | PZM+ | Feedback pulse output |
| B-20 | PZM- | Feedback pulse output |

## Pulse train I/O connector signals

| Terminal number | Signal name | Function |
|---|---|---|
| A-1 | NC | Reserved (use inhibited) |
| B-1 | NC | Reserved (use inhibited) |
| A-2 | NC | Reserved (use inhibited) |
| B-2 | PCLR | Differential clear input |
| A-3 | ORG-S | Return to the origin input |
| B-3 | RESET | Alarm reset input |
| A-4 | SERVO | Servo-ON input |
| B-4 | INH | Command pulse inhibition input |
| A-5 | DI 0 | General input 0 |
| B-5 | DI 1 | General input 1 |
| A-6 | DI 2 | General input 2 |
| B-6 | DI 3 | General input 3 |
| A-7 | DI 4 | General input 4 |
| B-7 | DI 5 | General input 5 |
| A-8 | DI 6 | General input 6 |
| B-8 | DI 7 | General input 7 |
| A-9 | DO 0 | General output 0 |
| B-9 | DO 1 | General output 1 |
| A-10 | DO 2 | General output 2 |
| B-10 | DO 3 | General output 3 |
| A-11 | DO 4 | General output 4 |
| B-11 | IN-POS | In-position output |
| A-12 | SRDY | Servo ready output |
| B-12 | ALM | Alarm output |
| A-13 | FG | Frame ground |
| B-13 | FG | Frame ground |
| A-14 | GND | Signal ground |
| B-14 | GND | Signal ground |
| A-15 | PULS+ | Command pulse input |
| B-15 | PULS- | Command pulse input |
| A-16 | DIR+ | Command direction input |
| B-16 | DIR- | Command direction input |
| A-17 | PA+ | Feedback pulse output |
| B-17 | PA- | Feedback pulse output |
| A-18 | PB+ | Feedback pulse output |
| B-18 | PB- | Feedback pulse output |
| A-19 | PZ+ | Feedback pulse output |
| B-19 | PZ- | Feedback pulse output |
| A-20 | PZM+ | Feedback pulse output |
| B-20 | PZM- | Feedback pulse output |

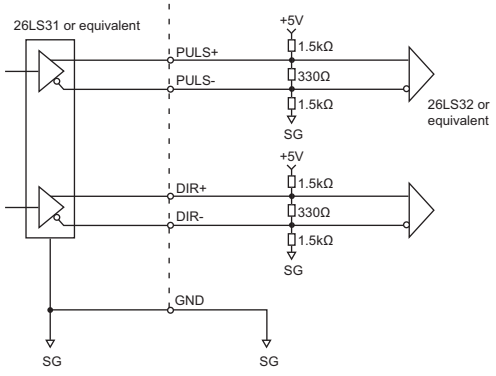
## Input / output wiring diagram



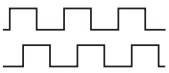
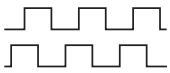
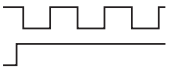
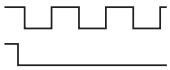
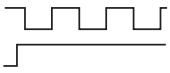
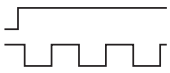
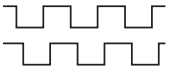
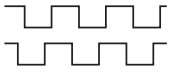
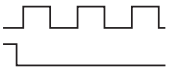
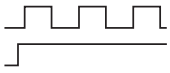
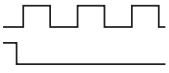

## Pulse train input section

The input method is line driver type capable of handling up to 2Mpps

**Example of connection with input signals**



## Pulse train input form

| Logic | Command pulse form | CW direction | CCW direction |
|---|---|---|---|
| Positive logic | Phase A / phase B |  |  |
| | Pulse / code |  |  |
| | CW / CCW |  |  |
| Negative logic | Phase A / phase B |  |  |
| | Pulse / code |  |  |
| | CW / CCW |  | |

## Robot Language Table

| Command | Description |
|---|---|
| MOVA | Moves to point data position. |
| MOVI | Moves from current position by amount of point data. |
| MOVF | Moves until specified DI input is received. |
| JMP | Jumps to a specified label in a specified program. |
| JMPF | Jumps to a specified label in a specified program according to the input condition. |
| JMPB | Jumps to a specified label when a general-purpose input or memory input is in the specified state. |
| L | Defines the jump destination for a JMP or JMPF statement, etc. |
| CALL | Runs another program. |
| DO | Turns general-purpose output or memory output on and off. |
| WAIT | Waits until a general-purpose input or memory input is in the specified state. |
| TIMR | Waits the specified amount of time before advancing to the next step. |
| P | Defines a point variable. |
| P+ | Adds 1 to a point variable. |
| P- | Subtracts 1 from a point variable. |
| SRVO | Turns a servo on and off. |
| STOP | Temporarily stops program execution. |
| ORGN | Performs return-to-origin. |
| TON | Runs a specified task. |
| TOFF | Stops a specified task. |
| JMPP | Jumps to a specified label when the axis positional relation meets the specified conditions. |
| MAT | Defines a matrix. |
| MSEL | Specifies a matrix to move. |
| MOVM | Moves to a specified pallet work position on matrix. |
| JMPC | Jumps to a specified label when counter array variable C equals to the specified value. |
| JMPD | Jumps to a specified label when counter variable D equals to the specified value. |
| CSEL | Specifies the array element of counter array variable C. |
| C | Defines counter array variable C. |
| C+ | Adds a specified value to counter array variable C. |
| C- | Subtracts a specified value from counter array variable C. |
| D | Defines counter variable D. |
| D+ | Adds a specified value to counter variable D. |
| D- | Subtracts a specified value from counter variable D. |
| SHFT | Shifts the coordinate position by amount of specified point data. |

## Standard accessories

### I/O flat cable (CN1)

Connector and flat cable used to connect the standard parallel I/O of the ERCD / SRCP30 controllers and an external equipment (sequencer). The cable is 1m long with its end cut and left as it is.

| Model | KAU-M4421-00 |
|---|---|

### Twisted-pair cable (CN2)

Connector and twisted pair cable used to connect parallel I/O of ERCD / SRCP30 controllers and an external equipment. The cable is 2m long with its end cut and left as it is. Select CN2 when using the pulse train input equipment.

| Model | KAU-M4421-10 |
|---|---|

1 to 2 axis

# DRCX

Robot controller

Supports XY-X series Cartesian robots and the Multi Flip-X.

Main functions ▶ P.036

## Features

### 1 Utilizes the same robot language and I/O control and other elements as the ERCX, SRCX, TRCX controllers

The DRCX also uses the HPB programming box, and PC support software POPCOM.

### 2 Utilizes program assets from older controllers!

The DRCX can reuse programs from previous 2 axis controllers DRC, DRCA, DRCH as is without changes.

### 3 Supports a full range of networks

Supports CC-link, DeviceNet, Profibus, and Ethernet.

## Model Overview

| Name | DRCX | |
|---|---|---|
| Power | 0505 / 0510 / 0520 / 1005 / 1010 / 2005 driver<br>Single phase 100 to 115V/200 to 230V<br>+/-10% maximum (50/60Hz) | 1020 / 2010 / 2020 driver<br>Single phase 200 to 230V<br>+/-10% maximum (50/60Hz) |
| Operating method | Programming / I/O point tracing / Remote command / Operation using RS-232C communication | |
| Maximum number of controllable axes | 2 axes maximum | |
| Position detection method | Incremental / Absolute | |
| Controllable robot | Cartesian robot XY-X / Single-axis robot FLIP-X / Pick & place robot YP-X | |
| Programming box | HPB / HPB-D (with enable switch) P.393 | |
| Support software for PC | POPCOM P.391 | |

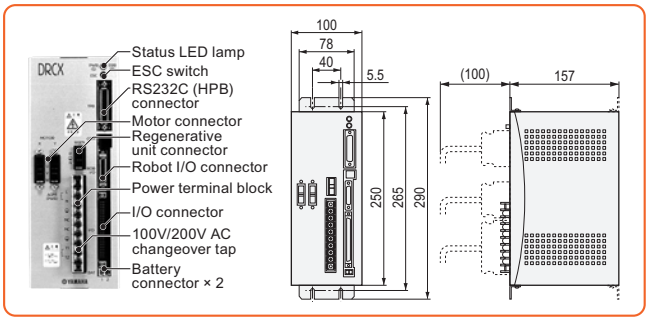
## Ordering method

**DRCX** – [ ] – [ ] – [ ] – [ ] – [ ] – [ ]

| Controller | X-axis driver Note | Y-axis driver Note | Usable for CE | Regenerative unit Note | Network Option | Battery |
|---|---|---|---|---|---|---|
| | 05: 100W or less<br>10: 200W<br>20: 400 to 600W | 05: 100W or less<br>10: 200W<br>20: 400 to 600W | No entry: Standard<br>E: CE marking | No entry: None<br>R: RGU-2 | No entry: None<br>CC: CC-Link<br>DN: DeviceNet<br>PB: Profibus<br>EN: Ethernet | B1: 700mAh<br>B2: 2000mAh |

Note. Driver selection and regenerative unit selection depends on the robot type.
Driver/Regenerative unit selection table (P.389)

## Part names / dimensions



# DRCX

## Basic specifications

| | Item | | Model | DRCX | | |
|---|---|---|---|---|---|---|
| Basic specifications | Applicable motor output | | | Driver model | X axis | Y axis |
| | | | | DRCX0505 | 100W or less | 100W or less |
| | | | | DRCX0510 | 100W or less | 200W |
| | | | | DRCX0520 | 100W or less | 400W to 600W |
| | | | | DRCX1005 | 200W | 100W or less |
| | | | | DRCX1010 | 200W | 200W |
| | | | | DRCX1020 | 200W | 400W to 600W |
| | | | | DRCX2005 | 400W to 600W | 100W or less |
| | | | | DRCX2010 | 400W to 600W | 200W |
| | | | | DRCX2020 | 400W to 600W | 400W to 600W |
| | Number of controllable axes | | | 2 axes | | |
| | Controllable robots | | | Cartesian robot XY-X, Single-axis robot FLIP-X, Pick & place robotYP-X | | |
| | Maximum power consumption | | | 1600VA (variable depending on robots) | | |
| | Dimensions | | | W100 × H250 × D157mm | | |
| | Weight | | | Approx. 2.1kg | | |
| | Input power supply | | | DRCX 0505 / 0510 / 1005 / 1010 / 2005: Single phase AC100 to 115V/AC200 to 230V+/-10% (50/60Hz)Note1<br>DRCX 1020 / 2010 / 2020: Single phase 200 to 230V+/-10% (50/60Hz) | | |
| Axis control | Drive method | | | AC full-digital software servo | | |
| | Position detection method | | | Resolver with multi-rotation absolute function | | |
| | Operating method | | | PTP (Point to Point), Linear interpolation, Circular interpolation, ARCH | | |
| | Position indication units | | | mm (millimeters), deg (degrees) | | |
| | Speed setting | | | 1% to 100% (Setting by 1% unit) | | |
| | Acceleration setting | | | 1. Automatic speed setting per robot No. and payload<br>2. Setting based on acceleration and deceleration parameter (Setting by 1% unit) | | |
| | Resolution | | | 16384 P/rev | | |
| | Origin search method | | | Absolute, Incremental | | |
| Program | Program language | | | YAMAHA BASIC | | |
| | Multitasks | | | 4 tasks maximum | | |
| | Point-data input method | | | Manual data input (coordinate value input) , Direct teaching, Teaching playback | | |
| | RAM | | | 128KB (With lithium battery backup) | | |
| | Programs | | | 100 programs<br>255 steps / 1 program 3000 steps / total | | |
| | Points | | | 1000 points | | |
| External input/output | I/O | Input | | General input 16 points, dedicated input 8 points | | |
| | | Output | | General output 13 points, dedicated output 3 points | | |
| | | Emergency stop input | | Normally-closed contact input (origin return not required after emergency stop is released) | | |
| | Brake output | | | Relay contact (for 24V/300mA brake) internal 2CH power supply (24V) | | |
| | Origin sensor input | | | Connectable to a DC24V B-contact sensor | | |
| | External communications | | | RS-232C: 1CH (for communication with HPB / HPB-D or PC) | | |
| | Options | Slots | | 1 | | |
| | | Type | | CC-Link / DeviceNet / Profibus / Ethernet | | |
| Options | Programming box | | | HPB, HPB-D (with enable switch) | | |
| | Support software for PC | | | POPCOM | | |
| General specifications | Operating temperature | | | 0°C to 40°C | | |
| | Storage temperature | | | -10°C to 65°C | | |
| | Operating humidity | | | 35% to 85%RH (non-condensing) | | |
| | Absolute backup battery | | | Ni-Cd battery | | |
| | Absolute data backup period | | | B1 (3.6V/700mAh): 120h | | |
| | | | | B2 (3.6V/2000mAh): 340h | | |
| | Ni-Cd battery charging method | | | Trickle charging | | |
| | Noise immunity | | | IEC61000-4-4 Level2 | | |

Note 1. When using 100V power, a jumper cable is required for the power terminal.

## Driver / regenerative unit selection table

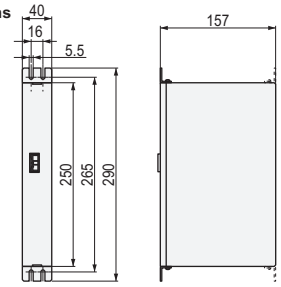
| | | FLIP-X | | XY-X | | | | | | | | | | | | | | YP-X | | Clean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Arm type, Gantry type, Moving arm type, Pole type | | | | | | | | XZ type | | | | | | | | |
| | | N15D | N18D | PXYx | FXYx | FXYBx | SXYx | SXYBx | MXYx | HXYx | HXYLx | SXYx (ZF) | SXYx (ZFL20) | SXYBx (ZF) | SXYBx (ZFL20) | MXYx | HXYx | YP220BX | YP320X | SxYxC |
| | | | | 2 axes | | | | | | | | | | | | | | | | 2 axes |
| DRCX | DRCX-0505 | | | ● | ● | ● | | | | | | ● | | | | | | ● | ● | |
| | DRCX-0510 | | | | | | | | | | | | ● | | | | | | | |
| | DRCX-1005 | | | | | | ● | ● | | | | | | ● | ● | | | | | ● |
| | DRCX-1010 | | | | | | | | | | | | | | | ● | | | | |
| | DRCX-1020 | | | | | | | | | | | | | | | | | | | |
| | DRCX-2010 | | | | | | | | ● | | | | | | | | ● | | | |
| | DRCX-2020 | ● | ● | | | | | | | ● | ● | | | | | | | | | |
| Regenera-tive unit | No entry (None) | | | ● | ● | ● | ● | | | | | ● | | | | | | | | ● |
| | R (RGU-2) | ● | ● | | | | | ● | ● | ● | ● | | ● | ● | ● | ● | ● | | | |

● Applicable

## Regenerative unit RGU-2 dimensions

### Regenerative unit RGU-2

Dimensions



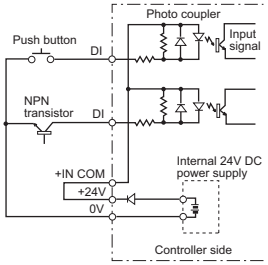

## Regenerative unit RGU-2 basic specifications

| Item | RGU-2 (for DRCX) |
|---|---|
| Model | KS5-M4107-0A (Including accessory) |
| Dimensions | W40 × H250 × D157mm |
| Weight | 0.9kg |
| Regenerative voltage | Approx. 380V or more |
| Regenerative stop voltage | Approx. 360V or less |
| Accessory | Cable for connection with controller (300mm) |

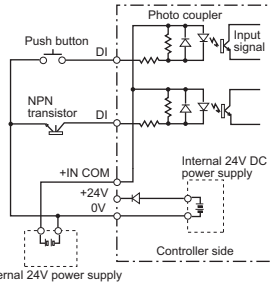
Note. Always leave an empty space (gap of about 20mm) between this unit and the adjacent controller. Also, always use the dedicated cable when connecting the controller.

## Example of input signal connection

● When using internal 24V power supply

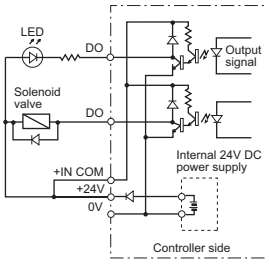



● When using external 24V power supply

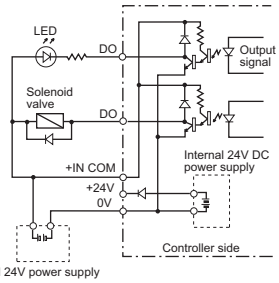



## Example of output signal connection

● When using internal 24V power supply




● When using external 24V power supply




## Connector I/O signals

| Terminal number | Signal name | Function |
|---|---|---|
| A-1 | ABS-PT | Move the point from the origin position |
| B-1 | INC-PT | Move the point from the current position |
| A-2 | AUTO-R | Start automatic operation |
| B-2 | STEP-R | Start step operation |
| A-3 | ORG-S | Return to the origin |
| B-3 | RESET | Reset |
| A-4 | SERVO | Return to servo on |
| B-4 | LOCK | Interlock |
| A-5 | DI 0 | General input 0 |
| B-5 | DI 1 | General input 1 |
| A-6 | DI 2 | General input 2 |
| B-6 | DI 3 | General input 3 |
| A-7 | DI 4 | General input 4 |
| B-7 | DI 5 | General input 5 |
| A-8 | DI 6 | General input 6 |
| B-8 | DI 7 | General input 7 |
| A-9 | DI 8 | General input 8 |
| B-9 | DI 9 | General input 9 |
| A-10 | DI 10 | General input 10 |
| B-10 | DI 11 | General input 11 |
| A-11 | DI 12 | General input 12 |
| B-11 | DI 13 | General input 13 |
| A-12 | DI 14 | General input 14 |
| B-12 | DI 15 | General input 15 |
| A-13 | +IN COM | Controller external +24V power input |
| B-13 | +IN COM | Controller external +24V power input |
| A-14 | +24V | Controller internal +24V power output |
| B-14 | +24V | Controller internal +24V power output |
| A-15 | 0V | Input/output standard 0V |
| B-15 | 0V | Input/output standard 0V |
| A-16 | DO 0 | General output 0 |
| B-16 | DO 1 | General output 1 |
| A-17 | DO 2 | General output 2 |
| B-17 | DO 3 | General output 3 |
| A-18 | DO 4 | General output 4 |
| B-18 | END | End normal execution |
| A-19 | BUSY | Executing the command |
| B-19 | READY | Ready for operation |
| A-20 | DO 5 | General output 5 |
| B-20 | DO 6 | General output 6 |
| A-21 | DO 7 | General output 7 |
| B-21 | DO 8 | General output 8 |
| A-22 | DO 9 | General output 9 |
| B-22 | DO 10 | General output 10 |
| A-23 | DO 11 | General output 11 |
| B-23 | DO 12 | General output 12 |
| A-24 | ENG 1 | Emergency stop input 1, used with EMG2 as a pair |
| B-24 | ENG 2 | Emergency stop input 2, used wi h EMG1 as a pair |

## Robot Language Table

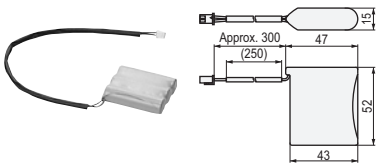
| Command | Description |
|---|---|
| MOVA | Moves to point data position. |
| MOVI | Moves from current position by amount of point data. |
| MOVF | Moves until specified DI input is received. |
| JMP | Jumps to a specified label in a specified program. |
| JMPF | Jumps to a specified label in a specified program according to the input condition. |
| JMPB | Jumps to a specified label when general-purpose input or memory input is in the specified state. |
| L | Defines the jump destination for a JMP or JMPF statement, etc. |
| CALL | Runs another program. |
| DO | Turns general-purpose output or memory output on and off. |
| WAIT | Waits until a general-purpose input or memory input is set in the specified state. |
| TIMR | Waits the specified amount of time before advancing to the next step. |
| P | Defines a point variable. |
| P+ | Adds 1 to a point variable. |
| P- | Subtracts 1 from a point variable. |
| SRVO | Turns the servo on or off for all axes or a specified axis. |
| STOP | Temporarily stops program execution. |
| MAT | Defines a matrix. |
| MSEL | Specifies a matrix to move. |
| MOVM | Moves to a specified pallet work position on matrix. |
| JMPC | Jumps to a specified label when counter array variable C equals the specified value. |
| JMPD | Jumps to a specified label when counter variable D equals the specified value. |
| CSEL | Specifies the array element of counter array variable C. |
| C | Defines counter array variable C. |
| C+ | Adds a specified value to counter array variable C. |
| C- | Subtracts a specified value from counter array variable C. |
| D | Defines counter variable D. |
| D+ | Adds a specified value to counter variable D. |
| D- | Subtracts a specified value from counter variable D. |
| ORGN | Executes return-to-origin on all axes or a specified axis. |
| ACHA | Defines an arch motion by setting a position. |
| ACHI | Defines an arch motion by setting a distance. |
| DRVA | Moves a specified axis to a specified point data position. |
| DRVI | Moves a specified axis a distance equal to specified point data from current position. |
| SHFT | Shifts the coordinate position by amount of specified point data. |
| TON | Runs a specified task. |
| TOFF | Stops a specified task. |
| JMPP | Jumps to a specified label when the axis positional relation meets the specifie. |
| MOVL | Executes linear interpolation motion. |
| MOVC | Executes circular interpolation motion. |

## Absolute battery B1 / B2

These batteries are for backing up the absolute data. B1 and B2 differ in the capacity. Select either one to be suitable for equipment stop time.
(Select from either B1 or B2 when ordering )

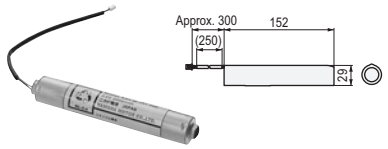
### B1 battery

Dimensions




### B2 battery

Dimensions




### Battery B1 / B2 basic specifications

| Item | B1 | B2 |
|---|---|---|
| Model | KR4-M4252-10 | KR4-M4252-00 |
| Battery type | Ni-Cd battery | |
| Battery capacity | 3.6V/700mAh | 3.6V/2,000mAh |
| Data holding time note | 120 hours | 340 hours |
| Dimensions | W52 × D47 × H15mm | ϕ29 × L152mm |
| Weight | 80g | 280g |
| Cable length | 300mm | 300mm |

Note. When power is turned OFF with fully charged battery mounted.

## Standard accessories

### I/O connector

| Model | KR4-M4421-00 |
|---|---|

Support software for PC

# POPCOM Windows

PC Offline Programming & Communication

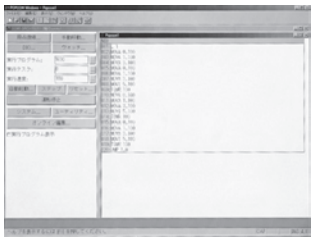
## Applicable controllers ▶ ERCD ERCX SR1-X SR1-P SRCP30 DRCX

POPCOM is an easy to operate application software that makes tasks such as robot operation, writing-editing programs, and point teaching easy to visually understand.

## Features

### 1 Easy to use

All items necessary for robot operation are displayed on single screen. There is no need to remember the menu structure so that it can be easily operated with mouse control by anybody.

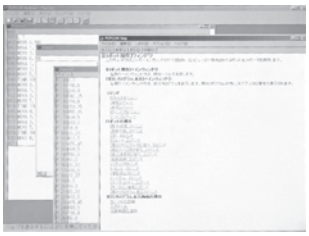


### 2 Program editing

Edit amendment, cut, copy, paste, syntax check and program entry can be performed efficiently with function keys.

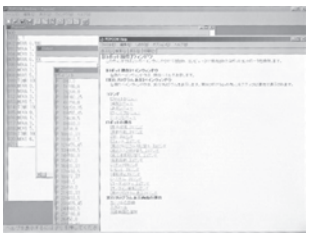
### 3 Point editing

Edit amendment, cut, copy, paste, syntax check, teach and trace functions are provided.



### 4 Help function

If you need some detailed information, robot language etc. during operation, operate [F1] key or [HELP] key to recall useful information on the screen.



### 5 Robot operation

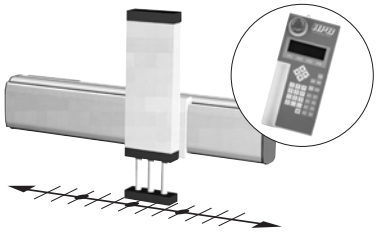
By connecting between a computer and the controller with a communication cable, the controller can control the robot in the same way as a HPB / HPB-D (programming box).

### 6 Creating point data

There are three methods available for creating the point data.

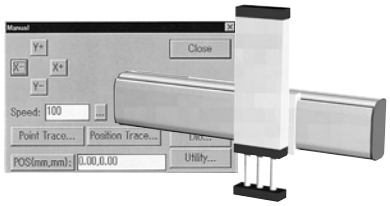
#### MDI (Manual Data Input) teaching

The numeric keyboard is used to enter position coordinate data directly.



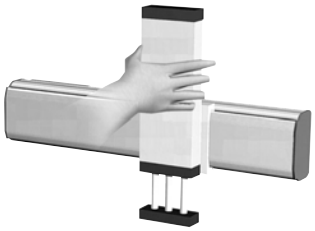
#### Remote teaching

The robot arm is actually moved to the target position using the keys for point data registration.




#### Direct teaching

The robot arm is manually moved to the target position with the servo motors off for point data registration.



Instruction manuals can be downloaded from our company website. Please use the following for more detailed information.
http //www.yamaha-motor.co jp/robot/

## PC supporting software POPCOM

| Model | KR4-M4966-00 |
|---|---|

Note. Use POPCOM with Version 1.13.0 or later when using SR1-P / SR1-X.

## Environment

| | |
|---|---|
| OS | Microsoft Windows 3.1/95/98/Me/NT/2000/XP<br>Note. The 64 bit version is not subject to the operation warranty. |
| CPU | Exceeding the environment recommended by the OS being used |
| Memory | Exceeding the environment recommended by the OS being used |
| Hard disk | Vacant capacity of more than 4MB in the installation destination drive |
| Disk operation | CD-ROM drive |
| Applicable controllers | ERCD / ERCX / SR1-P / SR1-X / SRCP30 / DRCX |

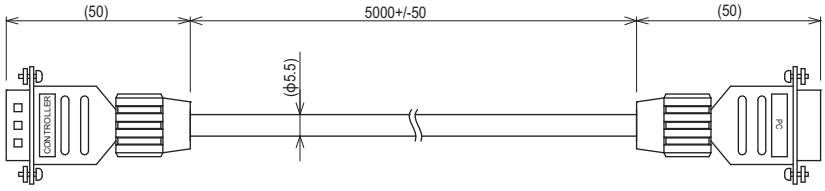
Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.

## Data cables (5m)

Communication cable to connect PC and a controller.

| Data cable (9Pin-9Pin) 5m | KAS-M538F-10 |
|---|---|

Note. Data cable jointly used for POPCOM, VIP, VIP+.
Note. Older type data cable is made for 9Pin-25Pin specifications.




## 9Pin-25Pin converter adapter

This is an adapter for converting the female D-sub25Pin to a female D-sub9Pin.
This adapter is needed if using the ERCX and DRCX.

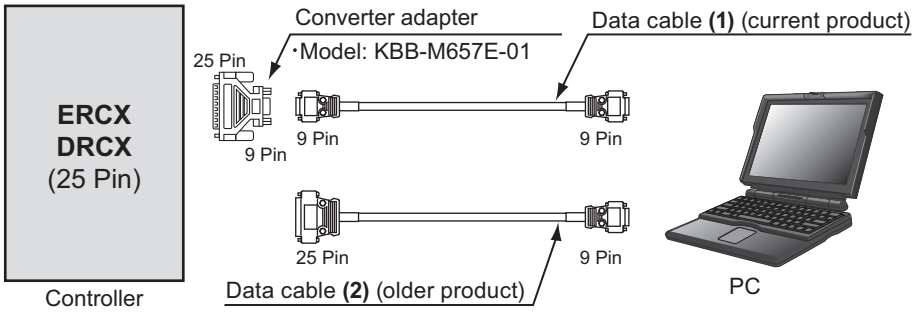
| Model | KBB-M657E-01 |
|---|---|

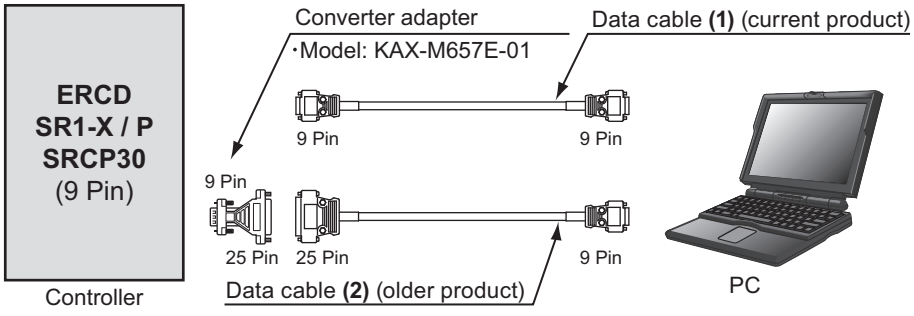
Note. It is unnecessary when using ERCD or SR1-X, SR1-P, SRCP30.

## Controller & data cable / converter adapter matchup table

| Data cables \ Controller | ●ERCX<br>●DRCX<br>(25Pin) | ●ERCD<br>●SR1-X/SR1-P<br>●SRCP30<br>(9Pin) |
|---|---|---|
| [9Pin-9Pin cable]<br>• KAS-M538F-10 (SSC-2-5L) | 9Pin-25Pin converter adapter<br>KBB-M657E-01 | Needs no converter adapter |
| [9Pin-25Pin cable]<br>• KR7-M538F-10 (SSC-1-3L)<br>• KR7-M538F-30 (SSC-1-5L) | Needs no converter adapter | 25Pin-9Pin converter adapter<br>KAX-M657E-01 |

## Controller and data cable connection diagrams




| | Data cables | Length | Cable model |
|---|---|---|---|
| (1) | 9pin ⟷ 9pin | 5m | KAS-M538F-10 |
| (2) | 25pin ⟷ 9pin | 3m | KR7-M538F-10 |
| | 25pin ⟷ 9pin | 5m | KR7-M538F-30 |

Programming box

# HPB/HPB-D

## Applicable controllers ▶ ERCD ERCX SR1-X SR1-P SRCP30 DRCX

All operations can be performed from this device including manual robot operation, programming entry and editing, teaching and setting parameters. The display works interactively with the operator so even an absolute beginner can easily learn how to use programming box.

## HPB / HPB-D basic specifications

| Name | | HPB | HPB-D |
|---|---|---|---|
| External view | | | |
| Model | Using with ERCD, SR1-X, SR1-P | KBB-M5110-01 (without a conversion adaptor) | KBB-M5110-21 (without a conversion adaptor) |
| | Using with ERCX, SRCP30, DRCX | KBB-M5110-0A (with a conversion adaptor) | KBB-M5110-2A (with a conversion adaptor) |
| Display | | LCD (20characters × 4 lines) | |
| Emergency stop button | | Normally closed contact point (with lock function) | |
| Enable switch | | – | 3-position |
| CE marking | | Not supported | Applicable |
| Memory back-up device | | SD Memory card | |
| Operating temperature | | 0°C to 40°C | |
| Operating humidity | | 35% to 85%RH (non-condensing) | |
| Dimensions | | W107 × H230 × D53mm (Strap holder, emergency stop button not included.) | |
| Weight | | 650g | |
| Cable length | | 3.5m | |

## Part names and function

**Emergency stop button**

Performs a robot emergency stop when pressed during robot operation. Release the button lock (locks when pressed) by turning the button in the CW direction. After releasing the button, a servo recovery must be performed from the HPB (or by I/O operation) in order to recover from the emergency stop status.

**Liquid crystal display**

This is a 20-character, 4-line LCD screen. The operation menu and other information are displayed here.

**Connector cable**

Connects the HPB to the controller. A D-Sub 9-pin connector (male) is provided at one end of the cable.

**Strap hole**

Attaching a short strap or necklace strap here prevents dropping the HPB while operating it or installing it onto equipment.

**SD memory card connector**

An SD memory card can be inserted here. SD memory cards are provided by the customer.

**Operation keys**

These keys are used to operate the robot and to enter programs and data, etc.
The keys are divided into 2 main groups: function keys and data entry/operation keys. (For operation key details, see Chapter 3, “Basic operations”.)

## HPB-D rear side

**Safety connector (HPB-D only)**

Use this connector with the emergency stop or enable switch to configure an external safety circuit. Attaching the supplied 15-pin D-sub connector (female) directly to this safety connector enables the emergency stop button only.

**3-position enable switch (HPB-D only)**

This switch is effective for use with an external safety circuit.
This switch opens (cuts off) the circuit when pressed or released.
Pressing it to mid-position connects the circuit. Use this switch as the enable switch in Service mode, so that the external safety circuit triggers emergency stop on the robot when this switch is pressed or released.

## A conversion adapter for HPB

The adapter converts from 25 pins to 9 pins. If the HPB was ordered along with a converter adapter then this adapter comes packed along with the unit.

| Model | KBB-M657E-01 |
|---|---|

Note. It is unnecessary when using ERCD or SR1-X, SR1-P, SRCP30.

Field network system with minimal wiring

# NETWORK

## Applicable controllers ▶ ERCX SR1-X SR1-P SRCP30 DRCX

### Network modules CC-Link

- Option unit with networking functions that can be incorporated in YAMAHA robot controllers, ERCX / SR1-P / SR1-X / SRCP30 / DRCX.
- As connection of the robot system and the sequencer requires only one (4-wire) dedicated cable, it is possible to save wiring of the entire system, which contributes to efficient wiring work, reduction of installation and maintenance costs, etc.
- Available I/Os are 32 general inputs / outputs and 16 dedicated inputs / outputs (2 nodes occupied).
- It is possible to perform position specification movement and data reading / writing directly by using the remote commands.

#### Basic specifications for network modules CC-Link

| Item | Network modules CC-Link |
|---|---|
| Applicable controllers | ERCX / SR1-P / SR1-X / SRCP30 / DRCX |
| Version supporting CC-Link | Ver. 1.10 |
| Remote node type | Remote device node |
| Number of occupied nodes | Two nodes fixed |
| Node number setting | 1 to 63 |
| Communication speed setting | 10Mbps, 5Mbps, 2.5Mbps, 625Kbps, 156Kbps |
| No. of CC-Link /O Note1 | General input 32 points, General output 32 points, Dedicated input 16 points, Dedicated Output 16 points |
| Parallel external /O (ERCX, SRCP30, DRCX only) | All points usable as parallel external /O for controller. Each point controllable from master station sequencer (PLC) by emulated serialization, regardless of robot program. |
| Shortest distance between nodes Note2 | 0.2m or more |
| Overall length Note2 | 100m/10Mbps, 160m/5Mbps, 400m/2.5Mbps, 900m/625Kbps, 1200m/156Kbps |
| Monitor LED | RUN, ERR, SD, RD |

Note 1. Controller I/Os are updated every 10ms.
Note 2. These values apply when a cable that supports CC-Link Ver 1.10 is used.

### Network modules DeviceNet

- Option unit with networking functions that can be incorporated in YAMAHA robot controllers, ERCX / SR1-P / SR1-X / SRCP30 / DRCX.
- As connection of the robot system and the sequencer requires only one (5-wire) dedicated cable, it is possible to reduce wiring of the entire system, which contributes to efficient wiring work, reduction of installation and maintenance costs, etc.
- Available I/Os are 16 general inputs / outputs and 16 dedicated inputs / outputs.
- It is possible to perform position specification movement and data reading / writing directly by using the remote commands.(SR1-X only)

#### Basic specifications for network modules DeviceNet

| Item | | Network modules DeviceNet |
|---|---|---|
| Applicable controllers | | ERCX / SR1-P / SR1-X / SRCP30 / DRCX |
| Applicable DeviceNet specifications | | Volume 1 Release2 0/Volume 2 Release2.0 |
| Device type | | Generic Device (device number 0) |
| Number of occupied CH | | Input 2ch Note1, Output 2ch Note1 |
| MAC ID setting | | 0 to 63 |
| Communication speed setting | | 500Kbps, 250Kbps, 125Kbps |
| DeviceNet /O Note2 | | General input 16 points Note3, General output 16 points Note3, Dedicated input 16 points, Dedicated Output 16 points |
| Parallel external /O (ERCX, SRCP30, DRCX only) | | All points usable as parallel external /O for controller. Each point controllable from master station sequencer (PLC) by emulated serialization, regardless of robot program. |
| Network length | Overall length Note | 100m/500Kbps, 250m/250Kbps, 500m/125Kbps |
| | Branch length/Overall branch length | 6m or less/39m or less, 6m or less/78m or less, 6m or less/156m or less |
| Monitor LED | | Module, Network |

Note 1. Inputs / Outputs are 12ch each when using SR1-P / SR1-X with extension model.
Note 2. Controller I/Os are updated every 10ms.
Note 3. General Inputs / Outputs are 32 each when using SR1-P / SR1-X with extension model.
Note 4. These values apply when a thick cable is used. The distance is less when a fine cable is used or when thick and fine cables are mixed in use.

### Network modules Profibus

- Option unit used to connect a YAMAHA robot controllers ERCX / SR1-P / SR1-X / SRCP30 / DRCX to Profibus.
- Optimum for high speed data communication and complicated communication processing.
- Communication is made available among devices of multiple number of manufacturers.
- It is possible to perform position specification movement and data reading / writing directly by using the remote commands.

#### Basic specifications for network modules Profibus

| Item | Network modules Profibus |
|---|---|
| Applicable controllers | ERCX / SR1-P / S R1-X / SRCP30 / DRCX |
| Communication profile | Profibus-DP slave |
| Number of occupied nodes | 1 node |
| Setting of station address | 0 to 126 |
| Communication speed setting | 9.6Kbps, 19.2Kbps, 93.75Kbps, 187.5Kbps, 500Kbps, 1.5Mbps, 3Mbps, 6Mbps, 12Mbps (automatic recognition) |
| Profibus /O Note | General input 32 points, General output 32 points, Dedicated input 16 points, Dedicated Output 16 points |
| Parallel external /O (ERCX / DRCX only) | All points usable as parallel external /O for controller. Each point controllable from master station sequencer (PLC) by emulated serialization, regardless of robot program. |
| Overall length | 100m/12Mbps, 200m/1.5Mbps, 400m/500Kbps, 1000m/187.5Kbps, 1200m/9.6K 19.2K 93.75Kbps |

Note. The shortest I/O update interval of the controller is 10ms but the actual I/O update time varies depending on the update time with the master station.

### Network modules Ethernet

- Option unit used to connect a YAMAHA robot controller to Ethernet, which can be incorporated in YAMAHA robot controllers, ERCX / SRCP30 / DRCX. Connection of this unit to the network operation by the TCP/IP protocol with a 10BASE-T cable makes data exchange with a robots easy.
- Capable of making an easy access from the TELNET terminal to the robot controller. As the command system is the same as that by the RS-232C communication, even first-time users can use it easily. (Windows PCs have a built-in TELNET terminal called TELNET.EXE as a standard equipment.)
- With a number of controllers connected in the network, it is possible to perform integrated information control over robots even at a distance from the work site.

#### Basic specifications for network modules Ethernet

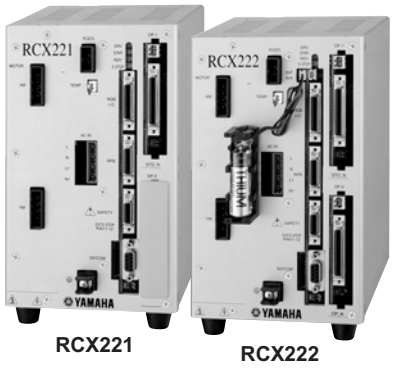
| Item | Network modules Ethernet |
|---|---|
| Applicable controllers | ERCX / SRCP30 / DRCX |
| Network specification | As specified for Ethernet (IEEE802.3) |
| Connector specification | RJ-45 connector (8-pole modular connector) 1 port |
| Baud rate | 10Mbps (10BASE-T) |
| Communication mode | Half Duplex (Half-duplex) |
| Network protocol | Application layer: TELNET / Transport layer: TCP / Network layer: IP, ICMP, ARP / Data link layer: CSMA/CD / Physical layer: 10BASE-T |
| Number of simultaneous log inputs | 1 |
| Setting of IP address, etc. | Set from HPB / HPB-D |
| Monitor LED | Run, Collision, Link, Transmit, Receive |

1 to 2 axis

# RCX221/RCX222

**Robot controller with advanced functions**

A 2-axis robot controller with a full range of advanced functions in a compact, space-saving size!
Very easy to use.




RCX221 RCX222

Main functions ▶ P.038

## Features

### 1 Compact

Lightweight and compact design with main unit weight of 2.8kg and height of 210mm.

### 2 Same price as predecessor “DRCX”

Delivers high-performance along with sophisticated functions yet is the same price as the prior DRCX.

### 3 The absolute position data hold time: 1 year

The current position information is monitored even during a long vacation, while the controller is kept unused and while it is transported so that the return to the origin process is not required when the controller is activated again. (RCX222 / RCX222HP)

### 4 Simultaneous control of PHASER and FLIP-X

Offers mixed control of linear motor single-axis robot PHASER series, along with 200 VAC motor single-axis robot FLIP-X series. (RCX221/RCX221HP)

### 5 Anti-collision control function

Internal function in controller acts to prevent carriage collisions when using double carriages.

### 6 Applicable to various peripheral equipments

Freely select I/O boards as needed.
Supports parallel I/O (NPN/PNP), CC-Link, DeviceNet, Profibus, and Ethernet.

### 7 Capable of using additional function of “YC-Link” for additional axis

Linking the RCX series controller with the SR1 series single-axis controller allows controlling a maximum of 8 axes (synchronous control of 6 axes).

## Model Overview

| Name | RCX221 / RCX221HP | RCX222 / RCX222HP |
|---|---|---|
| Power | Single phase: AC200V to 230V +/-10% maximum (50/60Hz) | |
| Operating method | Programming / I/O point tracing / Remote command / Operation using RS-232C communication | |
| Maximum number of controllable axes | 2 axes maximum | |
| Position detection method | Incremental / Semi-absolute | Absolute / Incremental |
| Controllable robot | Cartesian robot XY-X / Single-axis robot FLIP-X / Linear motor single-axis robot PHASER/ Pick & place robot YP-X | Cartesian robot XY-X / Single-axis robot FLIP-X / Pick & place robot YP-X |
| Programming box | RPB / RPB-E (with enable switch) P.413 | |
| Support software for PC | VIP+ P.410 / VIP | |

## Ordering method

### RCX221 / RCX221HP

**RCX221** – [ ] – [ ] – [ ] – [ ]

| Controller Note1 | Usable for CE | Regenerative unit Note2 | Input/Output Selection 1 | Input/Output Selection 2 |
|---|---|---|---|---|
| RCX221 | No entry: Standard | No entry: None | N: NPN No e3 | No entry: None |
| RCX221HP | E: CE marking | R: RG2 | P: PNP | N1: OP.DIO24/16 (NPN) Note3 |
| | | | CC: CC-Link | P1: OP.DIO24/17 (PNP) |
| | | | DN: DeviceNet | EN: Ethernet Note3 Note5 |
| | | | PB: Profibus | |
| | | | EN: Ethernet Note3 | |
| | | | YC: YC-Link Note | |

Note 1. Driver selection and regenerative unit selection depends on the robot type. See Specification selection table on following page.
Note 2. The regenerative unit (option) is required when operating a model designated by YAMAHA or a load with a large inertia.
Note 3. NPN and Ethernet are not selectable if using CE marking.
Note 4. Available only for the master.
Note 5. Only when you have selected CC, DN or PB for Input/Output selection 1, you can select EN for Input/Output selection 2.

### RCX222 / RCX222HP

**RCX222** – [ ] – [ ] – [ ] – [ ]

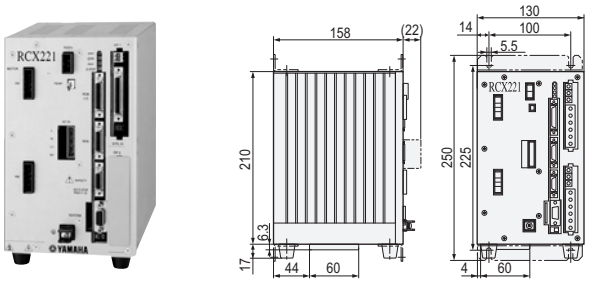
| Controller Note1 | Usable for CE | Regenerative unit Note2 | Input/Output Selection 1 | Input/Output Selection 2 |
|---|---|---|---|---|
| RCX222 | No entry: Standard | No entry: None | N: NPN Note3 | No entry: None |
| RCX222HP | E: CE marking | R: RG2 | P: PNP | N1: OP.DIO24/16 (NPN) No e3 |
| | | | CC: CC-Link | P1: OP.DIO24/17 (PNP) |
| | | | DN: DeviceNet | EN: Ethernet Note3 Note5 |
| | | | PB: Profibus | |
| | | | EN: Ethernet Note3 | |
| | | | YC: YC-Link No e | |

Note 1. Driver selection and regenerative unit selection depends on the robot type. See Specification selection table on following page.
Note 2. The regenerative unit (option) is required when operating a model designated by YAMAHA or a load with a large inertia.
Note 3. NPN and Ethernet are not selectable if using CE marking.
Note 4. Available only for the master.
Note 5. Only when you have selected CC, DN or PB for Input/Output selection 1, you can select EN for Input/Output selection 2.

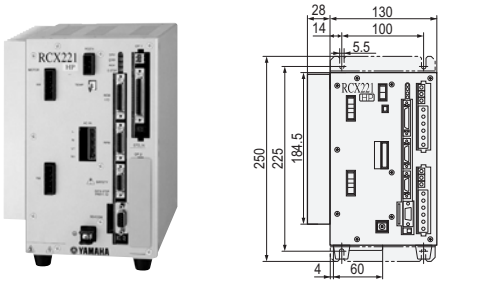
# RCX221/RCX222

## Part names / dimensions

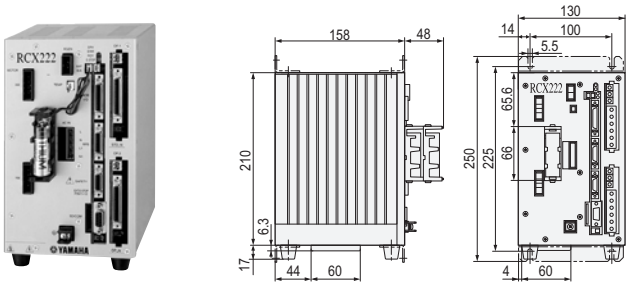
### RCX221 Dimensions



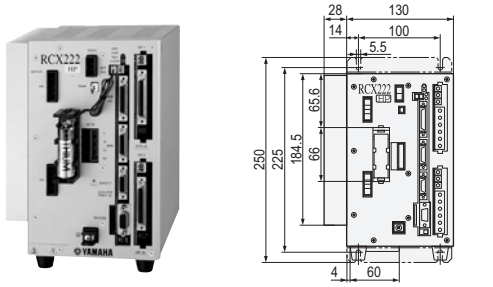

### RCX221HP Dimensions



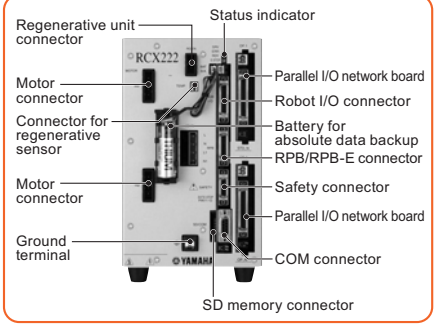

### RCX222 Dimensions




### RCX222HP Dimensions



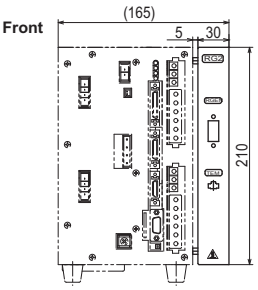

## Part names




Note. Photograph shows RCX222. The component names on the RCX221 are the same but it does not come with an absolute backup battery.

## Regenerative unit RG2

### Regenerative unit RG2




Note. Depth (D) is 158mm.
Installs on the right side of the RCX221 (HP), RCX222 (HP).
Cannot be installed as a separate unit.

### Basic specifications

| Item | RG2 |
|---|---|
| Model | KAS-M4130-00 (including cable supplied with unit) |
| Dimensions | W35 × H210 × D158mm |
| Weight | 0.8kg |
| Regenerative voltage | Approx. 420V or more |
| Regenerative stop voltage | Approx. 380V or less |
| Accessory | Cable for connection with controller (300mm) |

Note. Installs on the right side of the RCX221 (HP), RCX222 (HP).
Cannot be installed as a separate unit.

## Specification selection table

The robot type automatically determines the normal specifications or HP specifications.

### RCX221 / RCX221HP

| | | PHASER | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | MR12D | MR16D | MR16HD | MR20D | MR25D | MF15D | MF20D | MF30D | MF50D |
| RCX221 | | ● | ● | ● | | ● | ● | ● | | |
| RCX221HP | | | | | ● | | | | ● | ● |
| Regenerative unit | No entry (None) | ● | ● | ● | ● | | ● | | | |
| | R (RG2) | | | | | ● | | ● | ● | ● |

● : Applicable ○ : Regenerative unit RG2 is required for use at maximum speeds of 1875mm/sec or higher.

### RCX222 / RCX222HP

| | | FLIP-X | | XY-X | | | | | | | | | | | | | | YP-X | | Clean |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Arm type, Gantry type, Moving arm type, Pole type | | | | | | | | | XZ type | | | | | | | |
| | | N15D | N18D | PXYx | FXYx | FXYBx | SXYx | SXYBx | NXY | MXYx | HXYx | HXYLx | SXYx (ZF) | SXYx (ZFL20) | SXYBx (ZF) | SXYBx (ZFL20) | MXYx | HXYx | YP220BX | YP320X | SXYxC |
| | | | | 2 axes | | | | | | | | | | | | | | | | | 2 axes |
| RCX222 | | | | ● | ● | ● | ● | ● | ● | ● | | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| RCX222HP | | ● | ● | | | | | | | | ● | ● | | | | | | | | | |
| Regenerative unit | No entry (None) | | | ● | ● | ● | ● | ○ | | | | | ● | | ● | | | | | | ● |
| | R (RG2) | ● | ● | | | | | ○ | ● | ● | ● | ● | | ● | | ● | ● | ● | | | |

● : Applicable ○ : Select per conditions

### Conditions where regenerative unit is needed on multi robots

- Where motor capacity exceeds a total of 450W.
- Where motor capacity for perpendicular axis exceeds a total of 240W.
- Where the following conditions apply when perpendicular axis capacity is 240W or less.
  - perpendicular axis is 200W.
  - perpendicular axis is 100W and stroke is 700mm or more
  - where there are 2 perpendicular axes at 100W, and includes leads of 5mm
- Where maximum speed exceeds 1250mm per second with B14H.

## Basic specifications

| | Item | | Model | RCX221 | RCX221HP | RCX222 | RCX222HP |
|---|---|---|---|---|---|---|---|
| Basic specifications | Number of controllable axes | | | 2 axes maximum | | | |
| | Controllable robots | | | Single-axis robot FLIP-X, Linear motor single-axis robot PHASER, Cartesian robot XY-X, Pick & place robot YP-X | | Single-axis robot FLIP-X, Cartesian robot XY-X, Pick & place robot YP-X | |
| | Connected motor capacity | | | 2 axes total: 800W or less | 2 axes total: 900W to 1200W | 2 axes total: 800W or less | 2 axes total: 900W to 1200W |
| | Maximum power consumption | | | 1700VA | 2400VA | 1700VA | 2400VA |
| | Dimensions | | | W130 × H210 × D158mm | | | |
| | Weight | | | Approx. 2.9kg | Approx. 3.1kg | Approx. 2.9kg | Approx. 3.1kg |
| | Input power supply | Control power supply | | Single phase AC200 to 230V +/-10% maximum (50/60Hz) | | | |
| | | Motor power | | Single phase AC200 to 230V +/-10% maximum (50/60Hz) | | | |
| Axis control | Drive method | | | AC full-digital software servo | | | |
| | Position detection method | | | Resolver, Magnetic linear scale | | Multi-turn resolver with data backup function | |
| | Operating method | | | PTP (Point to Point), Linear interpolation, Circular interpolation, Arch motion | | | |
| | Coordinate system | | | Joint coordinates, Cartesian coordinates | | | |
| | Position indication units | | | Pulses, mm (millimeters), deg (degrees) | | | |
| | Speed setting | | | 1% to 100% (In units of 1%. However speed is in units of 0.01% during single-axis operation by DRIVE statement.) | | | |
| | Acceleration setting | | | 1.Automatic acceleration setting based on robot model type and end mass parameter<br>2.Setting based on acceleration and deceleration parameter (Setting by 1% unit) | | | |
| | Resolution | | | 1µm | | 16384 P/rev | |
| | Origin search method | | | Incremental / Semi-absolute | | Absolute / Incremental | |
| Program | Program language | | | YAMAHA BASIC (Conforming to JIS B8439 SLIM Language) | | | |
| | Multitasks | | | 8 tasks maximum | | | |
| | Sequence program | | | 1 program | | | |
| | Point-data input method | | | Manual data input (coordinate value input), Direct teaching, Teaching playback | | | |
| Memory | Memory capacity | | | 364KB (total capacity of program and points) (available program capacity during use of maximum number of points is 84KB) | | | |
| | Programs | | | 100 program 9,999: maximum lines per program 98KB: maximum capacity per program | | | |
| | Points | | | 10,000 points : maximum numbers of points | | | |
| | Memory Backup battery | | | Lithium metallic battery (service life 4 years at 0℃ to 40℃) | | | |
| | Internal flash memory | | | 512KB (ALL data only) | | | |
| External input/output | STD.DIO | I/O input | | Dedicated input 10 points, General input 16 points | | | |
| | | I/O output | | Dedicated Output12 points, General output 8 points | | | |
| | SAFETY | | | Emergency stop input (Relay contact), Service mode input (NPN/PNP specification is set according to STD. DIO setting) | | | |
| | Brake output | | | Relay contact | | | |
| | Origin sensor input | | | Connectable to DC 24V normally-closed contact sensor | | | |
| | External communications | | | RS232C: 1CH D-SUB9 (female) RS422 : 1CH (RPB) | | | |
| | Options | Slots | | 2 (inc.STD.DIO) | | | |
| | | Type | | STD.DIO (NPN/PNP): Dedicated input 10 points / General input 16 points, Dedicated Output 12 points / General output 8 points | | | |
| | | | | Optional input/output (NPN/PNP): General input 24 points / General output 16 points | | | |
| | | | | CC-Link: Dedicated input 16 points, Dedicated Output 16 points, General input 96 points, General output 96 points (4 nodes occupied) | | | |
| | | | | DeviceNet: Dedicated input 16 points, Dedicated Output 16 points, General input 96 points, General output 96 points | | | |
| | | | | Profibus: Dedicated input 16 points, Dedicated Output16 points, General input 96 points, General output 96 points | | | |
| | | | | Ethernet: IEEE802.3 10Mbps (10BASE-T) | | | |
| Options | Programming box | | | RPB, RPB-E (with enable switch) | | | |
| | Support software for PC | | | VIP+ / VIP | | | |
| General specifications | Operating temperature | | | 0°C to 40°C | | | |
| | Storage temperature | | | -10°C to 65°C | | | |
| | Operating humidity | | | 35% to 85%RH (non-condensing) | | | |
| | Absolute backup battery | | | – | | Lithium metallic battery 3.6V 5400mAH (2700nAH × 2) | |
| | Absolute data backup period | | | – | | 1 year (in state with no power applied) | |
| | Noise immunity | | | IEC61000-4-4 Level3 (UL1740) | | | |
| | Protecting structure | | | IP10 | | | |

## Power capacity

Required power supply capacity varies according to the robot type and number of axes. Prepare a power supply using the following table as a general guide.

### When connected to 2 axes (Cartesian robot or multi-axis robot)

| Axial current sensor value | | Power capacity (VA) |
|---|---|---|
| X axis | Y axis | |
| 05 | 05 | 500 |
| 10 | 05 | 700 |
| 10 | 10 | 900 |
| 20 | 05 | 1500 |
| 20 | 10 | 1700 |
| 20 | 20 | 2000 |
| | | 2400 (HP) |

Note. Even if axial current sensor values for each axis are interchanged no problem will occur.

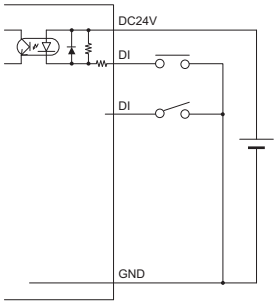
Motor capacity vs. current sensor table

| Connected motor capacity | Current sensor |
|---|---|
| 100W or less | 05 |
| 200W | 10 |
| 400W or more | 20 |

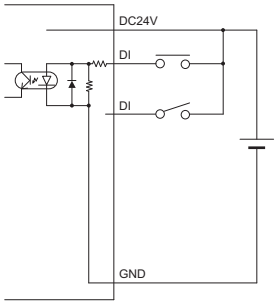
# RCX221/RCX222

## Example of input signal connection

● NPN specification

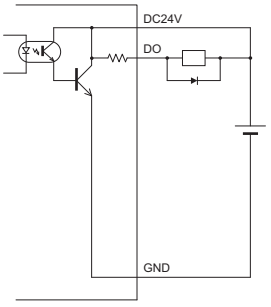



● PNP specification

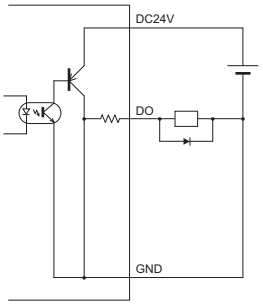



## Example of output signal connection

● NPN specification

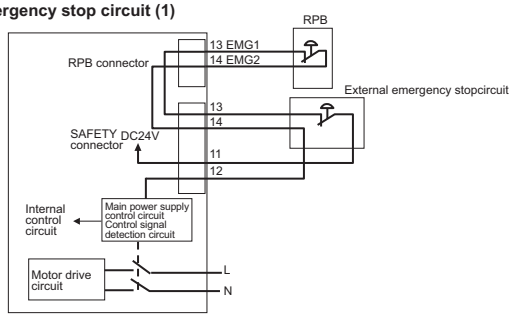



● PNP specification

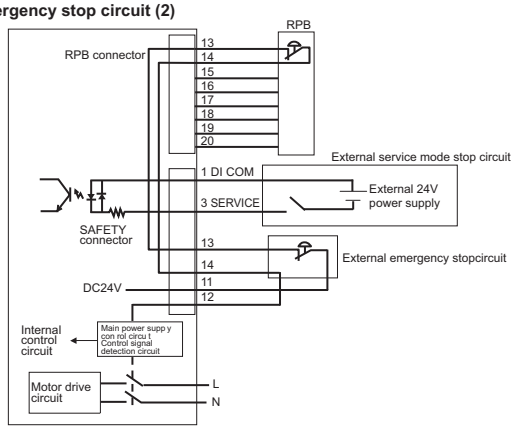



## Emergency input signal connections

● Connection when using the standard RPB with an external emergency stop circuit (1)




● Connection when using the standard RPB with an external emergency stop circuit (2)




## SAFETY connector signals

| Terminal number | I/O No. | Name |
|---|---|---|
| 1 | DI.COM | Dedicated input common |
| 2 | INTERLOCK | Interlock signal |
| 3 | SERVICE | SERVICE mode input |
| 4 | DO.COM | Dedicated output common |
| 5 | MPRDY | Main power supply ready |
| 6 | SERVO OUT | Servo-on state output |
| 7 | NC | No connection |
| 8 | KEY1 | RPB key switch contact |
| 9 | KEY2 | RPB key switch contact |
| 10 | 24VGND | EMG 24V, GND |
| 11 | EMG24V | Power supply for emergency stop input |
| 12 | EMGRDY | Emergency stop ready signal |
| 13 | EMGIN1 | Emergency stop input 1 |
| 14 | EMGIN2 | Emergency stop input 2 |
| 15 | EMGIN3 | Emergency stop input 3 |
| 16 | EMGIN4 | Emergency stop input 4 |
| 17 | LCKIN1 | Enable switch input 1 |
| 18 | LCKIN2 | Enable switch input 2 |
| 19 | LCKIN3 | Enable switch input 3 |
| 20 | LCKIN4 | Enable switch input 4 |

## Standard I/O [connector name: STD. DIO] signal table

| Terminal number | Signal name | Name | |
|---|---|---|---|
| | | RCX221 | RCX222 |
| 1 | DI01 | Servo ON | |
| 2 | DI10 | Sequence program control | |
| 3 | DI03 | Step run | |
| 4 | CHK1 | Check input 1 | |
| 5 | DI05 | I/O command run | |
| 6 | DI06 | Spare Note 1 | |
| 7 | DI07 | Spare Note 1 | |
| 8 | DI20 | General input 20 | |
| 9 | DI21 | General input 21 | |
| 10 | DI22 | General input 22 | |
| 11 | DI23 | General input 23 | |
| 12 | DI24 | General input 24 | |
| 13 | DI25 | General input 25 | |
| 14 | DI26 | General input 26 | |
| 15 | DI27 | General input 27 | |
| 16 | DO00 | EMG monitor (emergency stop monitor) | |
| 17 | DO01 | CPU OK | |
| 18 | DO10 | AUTO mode | |
| 19 | DO11 | Return-to-origin complete | |
| 20 | DO12 | Sequence program in progress | |
| 21 | DO13 | Auto operation in progress | |
| 22 | DO14 | Program reset output | |
| 23 | DO15 | Battery alarm output Note 2 | |
| 24 | DO16 | END | |
| 25 | DO17 | BUSY | |
| 26 | DI12 | Auto operation start | |
| 27 | DI13 | AUTO mode switching | |
| 28 | DI14 | ABS reset (Not in use normally) | Return-to-origin Note 3 |
| 29 | DI15 | Program reset | |
| 30 | DI16 | MANUAL mode | |
| 31 | DI17 | Return-to-origin (In use normally) | ABS reset Note 4 |
| 32 | DI30 | General input 30 | |
| 33 | DI31 | General input 31 | |
| 34 | DI32 | General input 32 | |
| 35 | DI33 | General input 33 | |
| 36 | DI34 | General input 34 | |
| 37 | DI35 | General input 35 | |
| 38 | DI36 | General input 36 | |
| 39 | DI37 | General input 37 | |
| 40 | CHK2 | Check input 2 | |
| 41 | DO02 | Servo-on state | |
| 42 | DO03 | Alarm | |
| 43 | DO20 | General output 20 | |
| 44 | DO21 | General output 21 | |
| 45 | DO22 | General output 22 | |
| 46 | DO23 | General output 23 | |
| 47 | DO24 | General output 24 | |
| 48 | DO25 | General output 25 | |
| 49 | DO26 | General output 26 | |
| 50 | DO27 | General output 27 | |

Note 1. Use of DI06, DI07 is prohibited.
Note 2. DO15 is a memory backup battery voltage drop alarm output.
Note 3. Set origin return for axes using incremental specifications and axes using semi-absolute specifications.
Note 4. Set origin return on axes using absolute specifications.

Area check output can be assigned to DO20 to DO27.
(Area check output assignment differs depending on the controller software version. See the user's manual for details.)

## Option I/O [connector name: OP. DIO] signal table

| Terminal number | Signal name | Name |
|---|---|---|
| 1 | – | Spare |
| 2 | DI40 | General input |
| 3 | – | Spare |
| 4 | DI41 | General input |
| 5 | – | Spare |
| 6 | – | Spare |
| 7 | – | Spare |
| 8 | DI50 | General input |
| 9 | DI51 | General input |
| 10 | DI52 | General input |
| 11 | DI53 | General input |
| 12 | DI54 | General input |
| 13 | DI55 | General input |
| 14 | DI56 | General input |
| 15 | DI57 | General input |
| 16 | – | Spare |
| 17 | – | Spare |
| 18 | DO30 | General output |
| 19 | DO31 | General output |
| 20 | DO32 | General output |
| 21 | DO33 | General output |
| 22 | DO34 | General output |
| 23 | DO35 | General output |
| 24 | DO36 | General output |
| 25 | DO37 | General output |
| 26 | DI42 | General input |
| 27 | DI43 | General input |
| 28 | DI44 | General input |
| 29 | DI45 | General input |
| 30 | DI46 | General input |
| 31 | DI47 | General input |
| 32 | DI60 | General input |
| 33 | DI61 | General input |
| 34 | DI62 | General input |
| 35 | DI63 | General input |
| 36 | DI64 | General input |
| 37 | DI65 | General input |
| 38 | DI66 | General input |
| 39 | DI67 | General input |
| 40 | – | Spare |
| 41 | – | Spare |
| 42 | – | Spare |
| 43 | DO40 | General output |
| 44 | DO41 | General output |
| 45 | DO42 | General output |
| 46 | DO43 | General output |
| 47 | DO44 | General output |
| 48 | DO45 | General output |
| 49 | DO46 | General output |
| 50 | DO47 | General output |

# RCX221/RCX222

## Robot Language Table

### General commands

| Language | Function |
|---|---|
| DECLARE | Declares that a label or sub-procedure is in an external program. |
| DEF FN | Defines a function that is available to the user. |
| DIM | Declares the name of an array variable and the number of elements. |
| EXIT FOR | Terminates a FOR statement to NEXT statement loop. |
| FOR to NEXT | Controls repetitive operations |
| GOSUB to RETURN | Jumps to a subroutine with the label specified by a GOSUB statement and executes the subroutine. |
| GOTO | Unconditionally jumps to the line specified by a label. |
| HALT | Stops a program and resets it. |
| HOLD | Pauses a program. |
| IF | Allows control flow to branch according to conditions. |
| LET | Executes a specified assignment statement. |
| ON to GOSU | Jumps to a subroutine with each label specified by a GOSUB statement according to conditions and executes the subrou ine. |
| ON to GOTO | Jumps to each line specified by a label according to conditions. |
| REM | All characters that follow REM or an apostrophe (') are viewed as comments. |
| SELECT CASE to END SELECT | Allows control flow to branch according to conditions. |
| SWI | Switches the currently executed program to a specified program, and executes from the first line after compiling. |
| WHILE to WEND | Controls repetitive operations. |
| Label statement | Defines "labels" in program lines. |

### Robot operation

| Language | Function |
|---|---|
| ABSRST | Performs return-to-origin along robot absolute motor axes. |
| DRIVE | Performs an absolute movement of each axis in the main group. |
| DRIVEI | Performs a relative movement of each axis in the main group. |
| MOVE | Performs an absolute movement of the main robot axes. |
| MOVEI | Performs a relative movement of the main robot axes. |
| ORIGIN | Performs return-to-origin on an incremental mode axis or absolute search on a semi-absolute mode axis. |
| PMOVE | Performs a pallet movement of the main robot axes. |
| SERVO | Controls the servo ON/OFF of the specified axes in the main group or all axes (in main group and sub group). |

### I/O control

| Language | Function |
|---|---|
| DELAY | Waits for the specified length of time (ms). |
| DO | Outputs the specified value to the DO ports. |
| LO | Outputs the specified value to the LO port to prohibit axis movement or permit axis movement. |
| MO | Outputs the specified value to the MO ports. |
| OUT | Turns ON the bits of the specified output ports and the command statement ends. |
| RESET | Turns OFF the bits of the specified output ports. |
| SET | Turns ON the bits of the specified output ports |
| SO | Outputs the specified value to the SO port. |
| TO | Outputs the specified value to the TO port. |
| WAIT | 1. Waits until the condition in DI/DO conditional expression are met.<br>2. Waits until positioning on the robot axes is complete (within the tolerance range). |

### Coordinate control

| Language | Function |
|---|---|
| CHANGE | Switches the hand of the main robot. |
| HAND | Defines the hand of the main robot. |
| RIGHTY / LEFTY | Selects whether the main robot will be "right-handed" or "left-handed" when moving to a point specified on a Cartesian coordinate system. |
| SHIFT | Sets the shift coordinates for the main robot by using the shift data specified by a shift variable. |

### Condition change

| Language | Function |
|---|---|
| ACCEL | Changes the acceleration coefficient parameter of the main group. |
| ARCH | Changes the arch position parameter of the main group. |
| ASPEED | Changes the automatic movement speed of he main group. |
| AXWGHT | Changes the axis tip weight parameter of the main group. |
| DECEL | Changes the deceleration rate parameter of the main group. |
| ORGORD | Sets the axis sequence parameter to perform return-to-origin and absolute search in the main group. |
| OUTPOS | Changes the OUT position parameter of the main group. |
| PDEF | Defines the pallet used to execute a pallet movement command. |
| SPEED | Changes the program speed for the main group. |
| TOLE | Changes the tolerance parameter of the main group. |
| WEIGHT | Changes the tip weight parameter of the main robot. |

### Communication control

| Language | Function |
|---|---|
| ONLINE / OFFLINE | Changes communication mode and initialize the communication port. |
| SEND | Sends the read file data into a write file. |

### Screen control

| Language | Function |
|---|---|
| PRINT | Displays the value of specified variable on the MPB/RPB screen. |

### Key control

| Language | Function |
|---|---|
| INPUT | Assigns a value to the variable specified from the MPB/RPB. |

### Procedure

| Language | Function |
|---|---|
| CALL | Calls up sub-procedures defined by the SUB and END SUB statements. |
| EXIT SUB | Terminates the sub-procedure defined by the SUB and END SUB statements. |
| SHARED | Does not permit variables declared with a program written outside a subprocedure (SUB to END SUB) to be passed on as dummy arguments, but allows them to be referred to with a sub-procedure. |
| SUB to END SUB | Defines a sub-procedure. |

### Task control

| Language | Function |
|---|---|
| CHGPRI | Changes the priority of the specified task. |
| CUT | Terminates a task currently being executed or temporarily stopped. |
| EXIT TASK | Terminates its own task currently being executed. |
| RESTART | Restarts a task that is temporarily stopped. |
| START | Sets the task number and priority of the specified task and starts that task. |
| SUSPEND | Temporarily stops another task being executed. |

### Error control

| Language | Function |
|---|---|
| ON ERROR GOTO | If an error occurs during program execution, this command allows the program to jump to the error processing routine specified by the label without stopping the program, or stops the program and displays the error message. |
| RESUME | Resumes the program execution after recovery from an error. This command is used in the error processing routine. |
| ERL | Gives the line number where an error occurred. |
| ERR | Gives the error code number when an error occurred. |

### PATH control

| Language | Function |
|---|---|
| PATH | Sets the PATH motion on the main robot axis. |
| PATH END | Terminates the path setting for PATH motion. |
| PATH SET | Starts the path setting for PATH motion. |
| PATH START | Starts the PATH motion. |

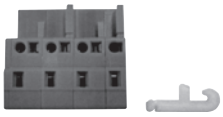
### Torque control

| Language | Function |
|---|---|
| DRIVE (with torque limit option) | Executes an absolute movement command on each axis in the main group. |
| TORQUE | Changes the maximum torque instruction for the specified main group axis. |
| TRQTIME | Sets the current limit time-out period on the specified main group axis when using a torque limit setting option in the DRIVE statement. |
| TRQTIME | Sets the current limit time-out period on the specified main group axis when using a torque limit setting option in the DRIVE statement. |

# Accessories and part options

## Standard accessories

### Power connector + wiring connection lever



| Model | KAS-M5382-00 |
|---|---|

Note. Jointly used by SR1-P / SR1-X, RCX240.

### Safety connector

| Model | KAS-M5370-00 |
|---|---|

### RPB terminator (dummy connector)

Attach this to the RPB connector during operation with the programming box RPB removed.

| Model | KAS-M5163-00 |
|---|---|

Note. Jointly used by RCX240.

### Standard I/O (STD.DIO) connector

| Model | KAS-M533G-00 |
|---|---|

### Option I/O (OP.DIO) connector

| Model | KAS-M533G-10 |
|---|---|

### L type stay (for installing front side, rear side.)

Use to install the controller.

| Model | KAS-M410H-00 |
|---|---|

Note. This type uses 1 stay.

### Absolute battery (for RCX222 only)

Battery for absolute data back-up.

● Absolute battery basic specifications

| Item | Absolute battery |
|---|---|
| Model | KAS-M53G0-10 |
| Battery type | Lithium metallic battery |
| Battery capacity | 3.6V/2,700mAh |
| Data holding time | 1year Note1 |
| Dimensions | ϕ17 × L53mm |
| Weight Note2 | 22g |

Note1. When using 2 batteries. Note2. Weight of battery itself.
Note. Jointly used by SR1-X, RCX240.

**Absolute battery installation conditions**

1 to 2 batteries are required for each 2 axes.

- 1 battery…Data storage time of approximately 6 months (with no power applied)
- 2 batteries…Data storage time of approximately 1 year (with no power applied)

Note. Absolute battery is not required for either of the 2 axes if using incremental or semi-absolute specifications.

## Options

### Programming box RPB / RPB-E

This device can perform all operations such as manual robot operation, program entry and edit, teaching and parameter settings.

| | RPB | RPB-E |
|---|---|---|
| Model | KBK-M5110-10 | KBK-M5110-00 |
| Enable switch | – | 3-position |
| CE marking | Not supported | Applicable |

P.413

### Support software for PC VIP+

VIP+ is a simple to use application software that makes tasks such as robot operation, writing-editing programs, and point teaching easy to visually understand.

| VIP+ software model | KX0-M4966-00 |
|---|---|

| Data cable (9Pin-9Pin) 5m | KAS-M538F-10 |
|---|---|

Note. Data cable jointly used for POPCOM, VIP, VIP+.

● Environment

| | |
|---|---|
| OS | Microsoft Windows 2000/XP/ Windows Vista Note The 64 bit version is not subject to the operation warranty. |
| CPU | Exceeding the environment recommended by the OS being used |
| Memory | Exceeding the environment recommended by the OS being used |
| Hard disk | Vacant capacity of more than 40MB in the installation destination drive |
| Communication method | RC232C, Ethernet<br>Note. The Ethernet usable unit is required separately for the Ethemet communication. |
| Applicable controllers | RCX221 / RCX222 / RCX141 / RCX142 / RCX240 |

Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.
Note. Ethernet is the registered trademark of US XEROX Corp.

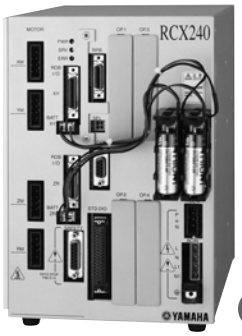
P.410

1 to 4 axis

# RCX240

**Robot controller with advanced functions**

**An advanced multi-axial controller newly developed based on long years of actual results! Along with a full range of functions, great engineering also makes it extremely easy to use!**




Main functions ▶ P.037

## Features

### 1 RCX141 and RCX142 united into one unit

Besides Cartesian and SCARA robots, this controller also handle a mixed combination of single axis robot FLIP-X and linear single-axis robot PHASER.

### 2 The absolute position data hold time: 1 year

The current position information is monitored even during a long vacation, while the controller is kept unused and while it is transported so that the return to the origin process is not required when the controller is activated again.

### 3 Linear and circular interpolation in 2 and 3 dimensions

These functions ensure smooth and high precision operation ideal for tasks such as sealing.

### 4 Passing point output

The general-purpose output can be turned on or off at the specified point during interpolation tasks without having to stop robot operation along that axis.

### 5 Area check output

During robot operation, this function sends an I/O output when the robot enters a preset area or zone.

### 6 Push function

This function controls the motor torque during grip and press-fit operation.

### 7 Dual-synchronous drive function

The RX240 includes a dual-drive function for simultaneously driving 2 axes. The dual drive function is effective on Cartesian robots for conveying heavy-weight payloads and long strokes along the Y axis.

### 8 Multitasking function

This function simultaneously runs multiple (maximum of 8 tasks) in parallel on robot peripheral equipment, etc.

### 9 2-robot control & auxiliary axis control

Assigning 2 robot units as main and sub allows multitasking as well as operating these robots asynchronously.

### 10 Supports a full range of options

Select from parallel I/O boards (NPN/PNP), and network options (CC-Link, DeviceNet, Profibus, Ethernet). Also supports the iVY board and tracking boards.

### 11 Capable of using additional function of "YC-Link option" for additional axis

Linking the RCX series controller with the SR1 series single-axis controller allows controlling a maximum of 8 axes (synchronous control of 6 axes).

### 12 Utilizes system assets from prior models RCX141 / RCX142

This RCX240 is compatible with systems using the RCX141, RCX142 and so can be shifted unchanged to function as host/upstream device on those systems.

## Model Overview

| Name | RCX240 |
|---|---|
| Power | Single phase : AC200V to 230V +/-10% maximum (50/60Hz) |
| Operating method | Programming / I/O point tracing / Remote command / Operation using RS-232C communication |
| Maximum number of controllable axes | 4 axes maximum |
| Position detection method | Incremental / Absolute |
| Controllable robot | Cartesian robot XY-X / SCARA robot YK-XG / Single-axis robot FLIP-X / Linear motor single-axis robot PHASER / Pick & place robot YP-X |
| Programming box | RPB / RPB-E (with enable switch) P.413 |
| Support software for PC | VIP+ P.410 / VIP |

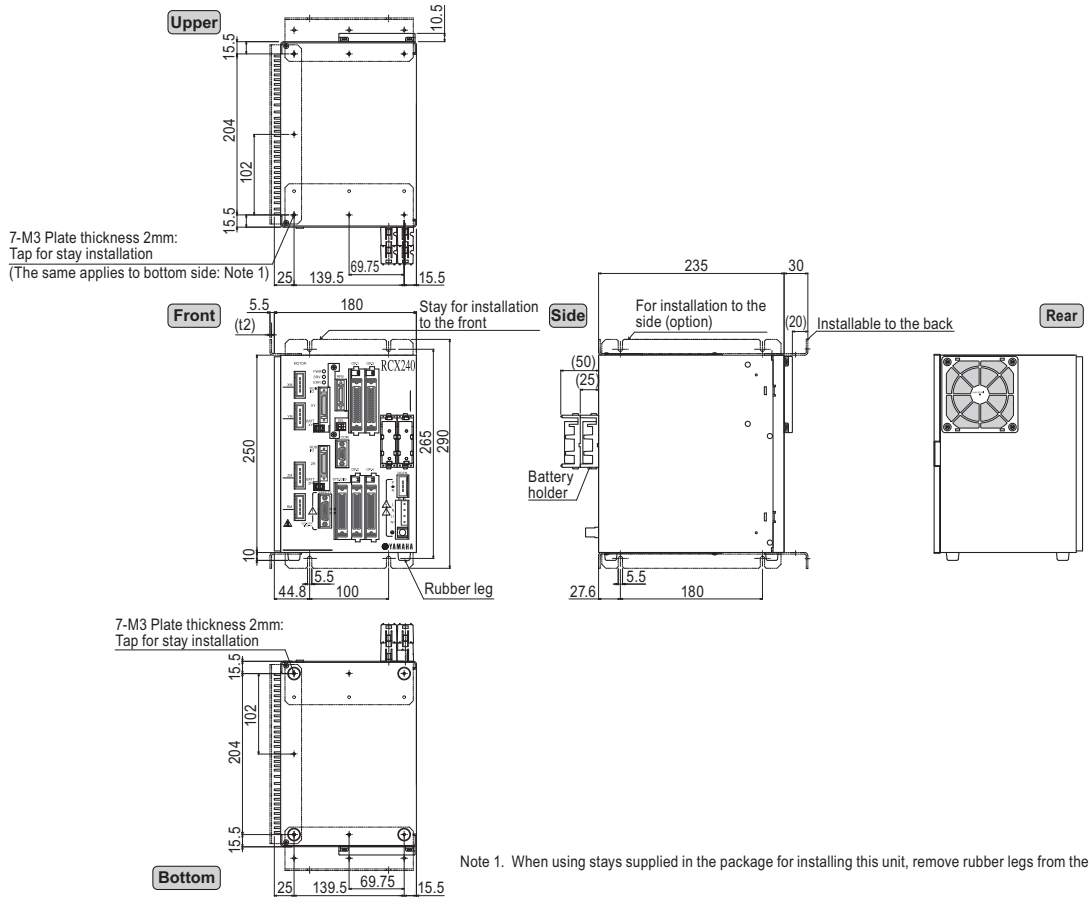
## Ordering method

**RCX240** – [ ] – [ ] – **N** Note3 – [ ] – **BB**

| Controller | Usable for CE | Regenerative unit Note1 | Option I/O | Network Option | Battery |
|---|---|---|---|---|---|
| | No entry: Standard | No entry: None | N, P: Standard I/O 16/8 | No entry: None | No entry: None Note5 |
| | E: CE marking | R: RGU-2 | N1, P1: 40/24 points | CC: CC-Link | B: 2pcs Note6 |
| | | R3: RGU-3 No e2 | N2, P2: 64/40 points | DN: DeviceNet | BB: 4pcs No e7 |
| | | | N3, P3: 88/56 points | PB: Profibus | |
| | | | N4, P4: 112/72 points | EN: Ethernet | |
| | | | | YC: YC-Link No e | |

Note 1. The regenerative unit (option) is required when operating a model designated by YAMAHA or a load with a large inertia.
Please refer to the following regenerative unit selection table.
Note 2. YK550X / YK500XG to YK1000XG are for RGU-3.
Note 3. Use N to N4 when NPN is selected on the I/O board, and P to P4 when PNP is selected.
Note 4. Available only for the master.
Note 5. Uses no-battery specifications if connecting to all axis - linear motor.
Note 6. If any or Single-axis among the XY axes are absolute specifications then 2 batteries are required.
Note 7. If any or Single-axis among the ZR axes are absolute specifications then 2 batteries are required.

## Dimensions




Note 1. When using stays supplied in the package for installing this unit, remove rubber legs from the bottom.

## Regenerative unit selection table

| | XY-X | | | | | YK-XG | | | | |

# RCX240

## Basic specifications

| | Item | | Model | RCX240 |
|---|---|---|---|---|
| Basic specifications | Number of controllable axes | | | 4 axes maximum (Control simultaneously: 4 axes) |
| | Controllable robots | | | Single-axis robot FLIP-X, Linear motor single-axis robot PHASER, Cartesian robot XY-X, SCARA robot YK-XG , Pick & place robot YP-X |
| | Maximum power consumption | | | 2500VA |
| | Capacity of the connected motor | | | 1600W |
| | Dimensions | | | W180 × H250 × D235mm |
| | Weight | | | 6.5kg |
| | Input power supply | Control power supply | | Single phase AC200 to 230V +/-10% maximum (50/60Hz) |
| | | Motor power supply | | Single phase AC200 to 230V +/-10% maximum (50/60Hz) |
| Axis control | Drive method | | | AC full-digital software servo |
| | Position detection method | | | Multi-turn resolver with data backup function, Magnetic linear scale |
| | Operating method | | | PTP (Point to Point), Linear interpolation, Circular interpolation, ARCH |
| | Coordinate system | | | Joint coordinates, Cartesian coordinates |
| | Position indication units | | | Pulses, mm (millimeters), deg (degrees) |
| | Speed setting | | | 1% to 100% (In units of 1%. However speed is in units of 0.01% during single-axis operation by DRIVE statement.) |
| | Acceleration setting | | | 1. Automatic acceleration setting based on robot model type and end mass parameter<br>2. Setting based on acceleration and deceleration parameter (Setting by 1% unit) |
| | Resolution | | | 16384 P/rev, 1μm |
| | Origin search method | | | Incremental, Absolute, Semi-absolute |
| Program | Program language | | | YAMAHA BASIC (Conforming to JIS B8439 SLIM Language) |
| | Multitasks | | | 8 tasks maximum |
| | Sequence program | | | 1 program |
| | Point-data input method | | | Manual data input (coordinate value input), Direct teaching, Teaching playback |
| Memory | Memory capacity | | | 364KB (total capacity of program and points)<br>(available program capacity during use of maximum number of points is 84KB) |
| | Programs | | | 100 program (Max.)　9,999: maximum lines per program　98KB: maximum capacity per program |
| | Points | | | 10,000 points: maximum numbers of points |
| | Memory Backup battery | | | Lithium metallic battery (service life 4 years at 0°C to 40°C) |
| | Internal flash memory | | | 512KB (ALL data only) |
| External input/output | STD.DIO | I/O input | | General input 16 points, dedicated input 10 points (NPN / PNP specifications selectable) |
| | | I/O output | | General output 8 points, dedicated output 11 points |
| | SAFETY | | | Emergency stop input (Relay contact), Service mode input (NPN/PNP specification is set according to STD. DIO setting) |
| | Brake output | | | Relay contact |
| | Origin sensor input | | | Connectable to DC 24V normally-closed contact sensor |
| | External communications | | | RS232C: 1CH D-SUB9 (female) RS422: 1CH (Dedicated RPB) |
| | Options | Slots | | 4 |
| | | Type | | Optional input/output (NPN/PNP): General input 24 points / General output 16 points |
| | | | | CC-Link: Dedicated input 16 points, Dedicated Output 16 points, General input 96 points, General output 96 points (4 nodes occupied) |
| | | | | DeviceNet: Dedicated input 16 points, Dedicated Output 16 points, General input 96 points, General output 96 points |
| | | | | Profibus: Dedicated input 16 points, Dedicated Output 16 points, General input 96 points, General output 96 points |
| | | | | Ethernet: IEEE802.3　10Mbps (10BASE-T) |
| | | | | iVY: Camera input (2ch), camera trigger input, PC connection input |
| | | | | Tracking: AB phase input, lighting trigger input, lighting power supply input/output |
| | | | | Lighting control: lighting trigger input, lighting power supply input/output |
| Options | Programming box | | | RPB, RPB-E (with enable switch) |
| | Support software for PC | | | VIP+ / VIP |
| General specifications | Operating temperature | | | 0°C to 40°C |
| | Storage temperature | | | -10°C to 65°C |
| | Operating humidity | | | 35% to 85%RH (non-condensing) |
| | Absolute backup battery | | | Lithium metallic battery　3.6V 5400mAH (2700mAH × 2) |
| | Absolute data backup period | | | 1 year (in state with no power applied) |
| | Noise immunity | | | IEC61000-4-4 Level 3 |
| | Protective structure | | | IP10 |

## Power capacity

The required power supply capacity and heat emission will vary depending on the robot type and number of axes.

Using the following table as a general guide consider the required power supply preparation and control panel size, controller installation, and cooling method.

### (1) When connected to SCARA robot

| Robot type | | | | Power capacity (VA) | Generated heat amount (W) |
|---|---|---|---|---|---|
| Standard type | Clean type | Dust-proof & drip-proof type | Ceiling-mount / inverse type | | |
| YK180X, 220X | – | – | – | 500 | 63 |
| YK250XH, 350XH, 400XH | YK250XCH, 350XCH, 400XCH | YK250XP, 350XP, 400XP | YK300XHS, 400XHS | 1000 | 75 |
| – | YK500XC, 600XC | YK500XP, 600XP | YK500XS, 600XS | 1500 | 88 |
| YK550X, 500XG, 600XG | – | – | – | 1700 | 93 |
| – | YK700XC, 800XC, 1000XC | YK700XP, 800XP, 1000XP | YK700XS, 800XS, 1000XS | 2000 | 100 |
| YK600XGH, 700XG, 800XG, 900XG, 1000XG, 1200X | – | – | – | 2500 | 113 |

### (2) When connected to 2 axis (Cartesian robot and/or multi-axis robot)

| Axial current sensor value Note | | Power capacity (VA) | Generated heat amount (W) |
|---|---|---|---|
| X axis | Y axis | | |
| 05 | 05 | 600 | 65 |
| 10 | 05 | 800 | 70 |
| 10 | 10 | 1000 | 75 |
| 20 | 05 | 1100 | 78 |
| 20 | 10 | 1300 | 83 |
| 20 | 20 | 1700 | 93 |

### (3) When connected to 3 axis (Cartesian robot and/or multi-axis robot)

| Axial current sensor value Note | | | Power capacity (VA) | Generated heat amount (W) |
|---|---|---|---|---|
| X axis | Y axis | Z axis | | |
| 05 | 05 | 05 | 700 | 68 |
| 10 | 05 | 05 | 900 | 73 |
| 10 | 10 | 05 | 1000 | 75 |
| 10 | 10 | 10 | 1200 | 80 |
| 20 | 05 | 05 | 1200 | 80 |
| 20 | 10 | 05 | 1300 | 83 |
| 20 | 10 | 10 | 1500 | 88 |
| 20 | 20 | 05 | 1600 | 90 |
| 20 | 20 | 10 | 1800 | 95 |
| 20 | 20 | 20 | 2000 | 95 |

### (4) When connected to 4 axis (Cartesian robot and/or multi-axis robot)

| Axial current sensor value Note | | | | Power capacity (VA) | Generated heat amount (W) |
|---|---|---|---|---|---|
| X axis | Y axis | Z axis | R axis | | |
| 05 | 05 | 05 | 05 | 800 | 70 |
| 10 | 05 | 05 | 05 | 1000 | 75 |
| 10 | 10 | 05 | 05 | 1100 | 78 |
| 10 | 10 | 10 | 05 | 1300 | 83 |
| 10 | 10 | 10 | 10 | 1400 | 85 |
| 20 | 05 | 05 | 05 | 1200 | 80 |
| 20 | 10 | 05 | 05 | 1400 | 85 |
| 20 | 10 | 10 | 05 | 1500 | 88 |
| 20 | 10 | 10 | 10 | 1700 | 93 |
| 20 | 20 | 05 | 05 | 1600 | 90 |
| 20 | 20 | 10 | 05 | 1800 | 95 |
| 20 | 20 | 10 | 10 | 2000 | 100 |
| 20 | 20 | 20 | 05 | 2100 | 103 |
| 20 | 20 | 20 | 10 | 2200 | 105 |
| 20 | 20 | 20 | 20 | 2500 | 113 |

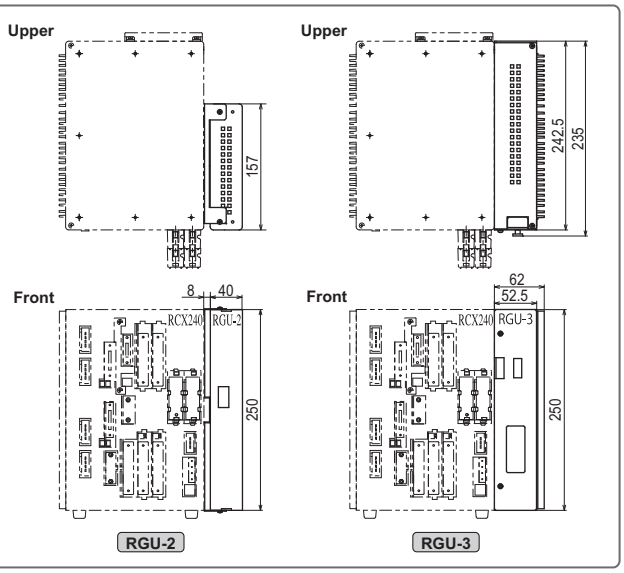
Note. Even if axial current sensor values for each axis are interchanged no problem will occur.

Note. Motor capacity vs. current sensor table

| Connected motor capacity | Current sensor |
|---|---|
| 100W or less | 05 |
| 200W | 10 |
| 400W or more | 20 |

# RCX240

## Regenerative unit




### RGU-2 basic specifications

| Item | RGU-2 |
|---|---|
| Model | KX0-M4107-20 (including cable supplied with unit) |
| Dimensions | W40 × H250 × D157mm |
| Weight | 0.9kg |
| Regenerative voltage | Approx. 380V or more |
| Regenerative stop voltage | Approx. 360V or less |
| Accessory | Cable for connection with controller (300mm) |

Note. Always leave an empty space (gap of about 20mm) between this unit and the adjacent controller. Also, always use the dedicated cable when connecting the controller.

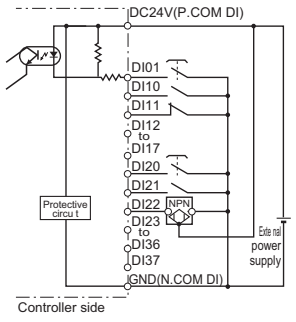
### RGU-3 basic specifications

| Item | RGU-3 |
|---|---|
| Model | KX0-M4107-30 (including cable supplied with unit) |
| Dimensions | W62 × H250 × D242.5mm |
| Weight | 3.7kg |
| Regenerative voltage | Approx. 380V or more |
| Regenerative stop voltage | Approx. 360V or less |
| Accessory | Cable for connection with controller (300mm) |

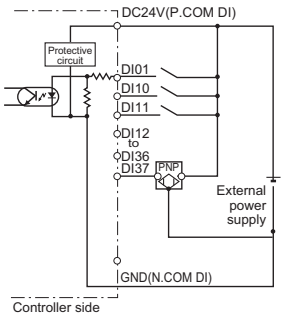
Note. Cannot be installed as a separate unit.

## Example of input signal connection

### NPN specification

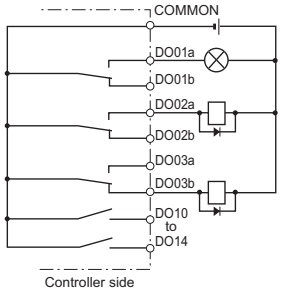



### PNP specification

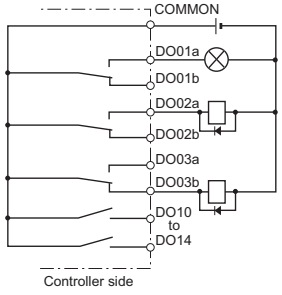



## Example of output signal connection

### NPN specification

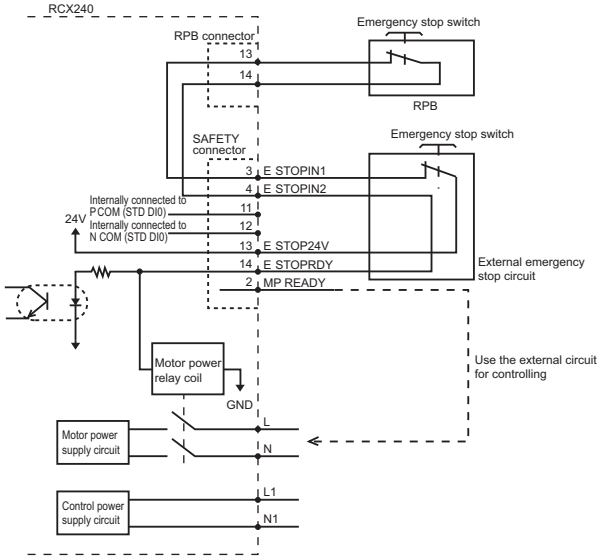



### PNP specification

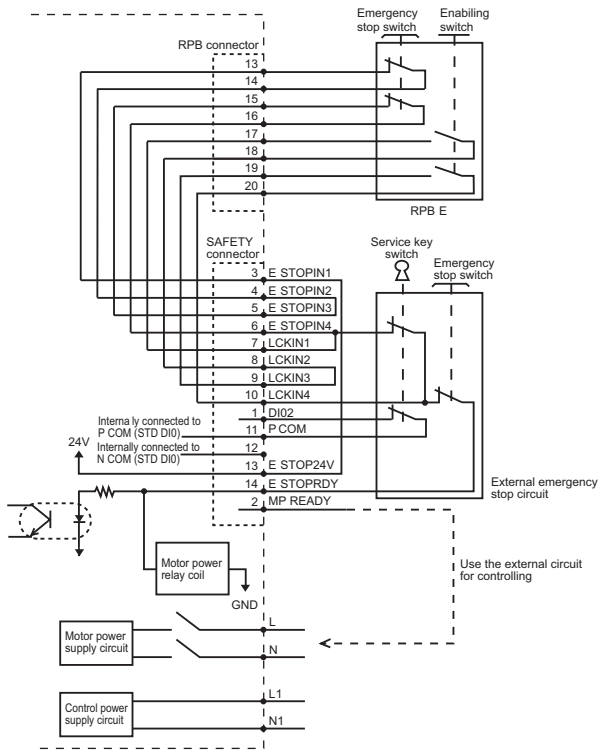



## Emergency input signal connections

### Connection when using the standard RPB with an external emergency stop circuit.




### Connections using the RPB-E enabling switch compatible programming unit with external emergency stop circuit (PNP specification)



## Connector input / output signals

| PIN | I/O No. | Name | Note |
|---|---|---|---|
| 1 | DI05 | I/O command execution trigger input | Common terminal : P.COMDI N.COMDI (Photo-coupler input) NPN specification : Source type PNP specification : Sink type |
| 2 | DI01 | Servo ON input | |
| 3 | DI10 | Sequence control | |
| 4 | DI11 | Interlock | |
| 5 | DI12 | Program start | |
| 6 | DI13 | AUTO mode input | |
| 7 | DI14 | Return-to-origin | |
| 8 | DI15 | Program reset | |
| 9 | DI16 | MANUAL mode input | |
| 10 | DI17 | Absolute reset / Return-to-origin | |
| 11 | DI20 | General input 20 | |
| 12 | DI21 | General input 21 | |
| 13 | DI22 | General input 22 | |
| 14 | DI23 | General input 23 | |
| 15 | DI24 | General input 24 | |
| 16 | DI25 | General input 25 | |
| 17 | DI26 | General input 26 | |
| 18 | DI27 | General input 27 | |
| 19 | DI30 | General input 30 | |
| 20 | DI31 | General input 31 | |
| 21 | DI32 | General input 32 | |
| 22 | DI33 | General input 33 | |
| 23 | DI34 | General input 34 | |
| 24 | DI35 | General input 35 | |
| 25 | DI36 | General input 36 | |
| 26 | DI37 | General input 37 | |

| PIN | I/O No. | Name | Note |
|---|---|---|---|
| 27 | COMMON | Relay common | (Relay output) Maximum capacity of each terminal (resistance load) : DC 24V 0.5A Common terminal : COMMON |
| 28 | DO01b | CPU_OK (B contact) | |
| 29 | DO01a | CPU_OK (A contact) | |
| 30 | DO02b | Servo ON output (B contact) | |
| 31 | DO02a | Servo ON output (A contact) | |
| 32 | DO03b | Alarm (B contact) | |
| 33 | DO03a | Alarm (A contact) | |
| 34 | DO10 | AUTO mode output | |
| 35 | DO11 | Return-to-origin complete | |
| 36 | DO12 | Sequence program in-progress | |
| 37 | DO13 | Robot program in-progress | |
| 38 | DO14 | Program reset | |
| 39 | DO20 | General output 20 | (Transistor output) NPN specification or PNP specification Maximum capacity of each terminal (resistance load) : 0.1A +Common terminal : DC+24V - Common terminal : GND |
| 40 | DO21 | General output 21 | |
| 41 | DO22 | General output 22 | |
| 42 | DO23 | General output 23 | |
| 43 | DO24 | General output 24 | |
| 44 | DO25 | General output 25 | |
| 45 | DO26 | General output 26 | |
| 46 | DO27 | General output 27 | |
| 47 | DC24V | DC+24V (P.COMDI) | External power supply input |
| 48 | | | |
| 49 | GND | GND (N.COMDI) | |
| 50 | | | |

## SAFETY connector signals

| Terminal number | RPB connected | | RPB-E connected | |
|---|---|---|---|---|
| | I/O No. | Name | I/O No. | Name |
| 1 | DI02 | SERVICE mode | DI02 | SERVICE mode |
| 2 | MP READY | Motor power ready signal | MP READY | Motor power ready signal |
| 3 | E-STOPIN 1 | Emergency stop input 1 | E-STOPIN 1 | Emergency stop input 1 |
| 4 | E-STOPIN 2 | Emergency stop input 2 | E-STOPIN 2 | Emergency stop input 2 |
| 5 | NC | NC | E-STOPIN 3 | Emergency stop input 3 |
| 6 | NC | NC | E-STOPIN 4 | Emergency stop input 4 |
| 7 | NC | NC | LCKIN 1 | Enabling switch input 1 |
| 8 | NC | NC | LCKIN 2 | Enabling switch input 2 |
| 9 | NC | NC | LCKIN 3 | Enabling switch input 3 |
| 10 | NC | NC | LCKIN 4 | Enabling switch input 4 |
| 11 | P.COM | DC+24V (P.COM DI) | P.COM | DC+24V (P.COM DI) |
| 12 | N.COM | GND (N.COM DI) | N.COM | GND (N.COM DI) |
| 13 | E-STOP 24V | Emergency stop input supply | E-STOP 24V | Emergency stop input supply |
| 14 | E-STOPRDY | Emergency stop READY signal | E-STOPRDY | Emergency stop READY signal |
| 15 | NC | NC | NC | NC |

## Standard functions of the controller

| Function | Description |
|---|---|
| **Operation mode** | Automatic mode (main task: execution of program, execution of step), Program mode (main task: creation of program), Manual mode (main task: jog movement, point teaching), System mode (main task: parameter editing, data initialization), Utility mode (main task: operation of motor power source) |
| **Command** | Array declarator command (DIM statement), Assignment command (numeric value assignment statement, character string assignment statement, point definition statement), Movement related command (MOVE statement, DRIVE statement, PMOVE statement), Condition branching command (IF statement, FOR statement, WHILE statement), External output command (DO statement, MO statement, LO statement, TO statement, SO statement), Parameter command (ACCEL statement, OUTPOS statement, TOLE statement), Task related command (START statement, SUSPEND statement, CUT statement), Condition wait command (WAIT statement), etc. |
| **Function** | Arithmetic function (SIN function, COS function, TAN function), Character string function (STR$ function, LEFT$ function, MID$ function, RIGHT$ function), Point function (WHERE function, JTOXY function, XYTOJ function), Parameter function (ACCEL statement, OUTPOS statement, TOLE statement), etc. |
| **Variable** | Simple variable (integer type variable, real number type variable, character string type variable), Array variable (integer type variable, real number type variable, character string type variable), Point variable, Shift variable, Element variable (point element variable, shift element variable), Input/output variable, etc. |
| **Operator** | Arithmetic operator (+, -, ∗, /, MOD), Logical operator (AND, OR, XOR), Comparison operator (=, <, >, <>, <=, >=) |
| **Monitor** | Monitor of input/output (200ms interval) |
| **On-line command** | Key operation command (AUTO, RUN, RESET, STEP), Data handling command (READ, WRITE, ?VER, ?CONFIG), Utility command (COPY, ERA, INIT), Robot language command (independently executable command) |
| **Data file** | Program, Point, Parameter, Shift, Hand, All, Error history, etc. |
| **Internal timer** | 10ms interval |
| **Program break point** | 4 points at maximum |

## Robot Language Table

### General commands

| Language | Function |
|---|---|
| DECLARE | Declares that a label or sub-procedure is in an external program. |
| DEF FN | Defines a function that is available to the user. |
| DIM | Declares the name of an array variable and the number of elements. |
| EXIT FOR | Terminates a FOR statement to NEXT statement loop. |
| FOR to NEXT | Controls repetitive operations |
| GOSUB to RETURN | Jumps to a subroutine with the label specified by a GOSUB statement and executes the subroutine. |
| GOTO | Unconditionally jumps to the line specified by a label. |
| HALT | Stops a program and resets it. |
| HOLD | Pauses a program. |
| IF | Allows control flow to branch according to conditions. |
| LET | Executes a specified assignment statement. |
| ON to GOSU | Jumps to a subroutine with each label specified by a GOSUB statement according to conditions and executes the subrou ine. |
| ON to GOTO | Jumps to each line specified by a label according to conditions. |
| REM | All characters that follow REM or an apostrophe (') are viewed as comments. |
| SELECT CASE to END SELECT | Allows control flow to branch according to conditions. |
| SWI | Switches the currently executed program to a specified program, and executes from the first line after compiling. |
| WHILE to WEND | Controls repetitive operations. |
| Label statement | Defines "labels" in program lines. |

### Robot operation

| Language | Function |
|---|---|
| ABSRST | Performs return-to-origin along robot absolute motor axes. |
| DRIVE | Performs an absolute movement of each axis in the main group. |
| DRIVEI | Performs a relative movement of each axis in the main group. |
| MOVE | Performs an absolute movement of the main robot axes. |
| MOVEI | Performs a relative movement of the main robot axes. |
| ORIGIN | Performs return-to-origin on an incremental mode axis or absolute search on a semi-absolute mode axis. |
| PMOVE | Performs a pallet movement of the main robot axes. |
| SERVO | Controls the servo ON/OFF of the specified axes in the main group or all axes (in main group and sub group). |

### I/O control

| Language | Function |
|---|---|
| DELAY | Waits for the specified length of time (ms). |
| DO | Outputs the specified value to the DO ports. |
| LO | Outputs the specified value to the LO port to prohibit axis movement or permit axis movement. |
| MO | Outputs the specified value to the MO ports. |
| OUT | Turns ON the bits of the specified output ports and the command statement ends. |
| RESET | Turns OFF the bits of the specified output ports. |
| SET | Turns ON the bits of the specified output ports |
| SO | Outputs the specified value to the SO port. |
| TO | Outputs the specified value to the TO port. |
| WAIT | 1. Waits until the condition in DI/DO conditional expression are met.<br>2. Waits until positioning on the robot axes is complete (within the tolerance range). |

### Coordinate control

| Language | Function |
|---|---|
| CHANGE | Switches the hand of the main robot. |
| HAND | Defines the hand of the main robot. |
| RIGHTY / LEFTY | Selects whether the main robot will be "right-handed" or "left-handed" when moving to a point specified on a Cartesian coordinate system. |
| SHIFT | Sets the shift coordinates for the main robot by using the shift data specified by a shift variable. |

### Condition change

| Language | Function |
|---|---|
| ACCEL | Changes the acceleration coefficient parameter of the main group. |
| ARCH | Changes the arch position parameter of the main group. |
| ASPEED | Changes the automatic movement speed of he main group. |
| AXWGHT | Changes the axis tip weight parameter of the main group. |
| DECEL | Changes the deceleration rate parameter of the main group. |
| ORGORD | Sets the axis sequence parameter to perform return-to-origin and absolute search in the main group. |
| OUTPOS | Changes the OUT position parameter of the main group. |
| PDEF | Defines the pallet used to execute a pallet movement command. |
| SPEED | Changes the program speed for the main group. |
| TOLE | Changes the tolerance parameter of the main group. |
| WEIGHT | Changes the tip weight parameter of the main robot. |

### Communication control

| Language | Function |
|---|---|
| ONLINE / OFFLINE | Changes communication mode and initialize the communication port. |
| SEND | Sends the read file data into a write file. |

### Screen control

| Language | Function |
|---|---|
| PRINT | Displays the value of specified variable on the MPB/RPB screen. |

### Key control

| Language | Function |
|---|---|
| INPUT | Assigns a value to the variable specified from the MPB/RPB. |

### Procedure

| Language | Function |
|---|---|
| CALL | Calls up sub-procedures defined by the SUB and END SUB statements. |
| EXIT SUB | Terminates the sub-procedure defined by the SUB and END SUB statements. |
| SHARED | Does not permit variables declared with a program written outside a subprocedure (SUB to END SUB) to be passed on as dummy arguments, but allows them to be referred to with a sub-procedure. |
| SUB to END SUB | Defines a sub-procedure. |

### Task control

| Language | Function |
|---|---|
| CHGPRI | Changes the priority of the specified task. |
| CUT | Terminates a task currently being executed or temporarily stopped. |
| EXIT TASK | Terminates its own task currently being executed. |
| RESTART | Restarts a task that is temporarily stopped. |
| START | Sets the task number and priority of the specified task and starts that task. |
| SUSPEND | Temporarily stops another task being executed. |

### Error control

| Language | Function |
|---|---|
| ON ERROR GOTO | If an error occurs during program execution, this command allows the program to jump to the error processing routine specified by the label without stopping the program, or stops the program and displays the error message. |
| RESUME | Resumes the program execution after recovery from an error. This command is used in the error processing routine. |
| ERL | Gives the line number where an error occurred. |
| ERR | Gives the error code number when an error occurred. |

### PATH control

| Language | Function |
|---|---|
| PATH | Sets the PATH motion on the main robot axis. |
| PATH END | Terminates the path setting for PATH motion. |
| PATH SET | Starts the path setting for PATH motion. |
| PATH START | Starts the PATH motion. |

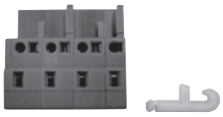
### Torque control

| Language | Function |
|---|---|
| DRIVE (with torque limit option) | Executes an absolute movement command on each axis in the main group. |
| TORQUE | Changes the maximum torque instruction for the specified main group axis. |
| TRQTIME | Sets the current limit time-out period on the specified main group axis when using a torque limit setting option in the DRIVE statement. |
| TRQTIME | Sets the current limit time-out period on the specified main group axis when using a torque limit setting option in the DRIVE statement. |

# Accessories and part options

## Standard accessories

### Power connector + wiring connection lever



| Model | KAS-M5382-00 |
|---|---|

Note. Jointly used by SR1-P / SR1-X, RCX221 / 222.

### Safety connector

| Model | KX0-M5163-00 |
|---|---|

### RPB terminator (dummy connector)

Attach this to the RPB connector during operation with the programming box RPB removed.

| Model | KAS-M5163-00 |
|---|---|

Note. Jointly used by RCX221 / 222.

### Standard I/O (STD.DIO) connector

| Model | KX0-M533G-00 |
|---|---|

### L type stay (for installing front side, rear side.)

Use to install the controller.

| Model | KX0-M410H-00 |
|---|---|

### Absolute battery

Battery for absolute data back-up.

● Absolute battery basic specifications

| Item | Absolute battery |
|---|---|
| Model | KAS-M53G0-10 |
| Battery type | Lithium metallic battery |
| Battery capacity | 3.6V/2,700mAh |
| Data holding time | 1year Note1 (in state with no power applied) |
| Dimensions | ϕ17 × L53mm |
| Weight Note2 | 22g |

Note1. When using 2 batteries. Note2. Weight of battery itself.

Note. Jointly used by SR1-X, RCX222.

**Absolute battery installation conditions**

1 to 2 batteries are required for each 2 axes.

- 1 battery…Data storage time of approximately 6 months (with no power applied)
- 2 batteries…Data storage time of approximately 1 year (with no power applied)

Note. Absolute battery is not required for either of the 2 axes if using incremental or semi-absolute specifications.

## Options

### L type stay (for side surface installation)

Use to install the controller.

| Model | KX0-M410H-10 |
|---|---|

### Support software for PC VIP+

VIP+ is a simple to use application software that makes tasks such as robot operation, writing-editing programs, and point teaching easy to visually understand.

| VIP+ software model | KX0-M4966-00 |
|---|---|

| Data cable (9Pin-9Pin) 5m | KAS-M538F-10 |
|---|---|

Note. Data cable jointly used for POPCOM, VIP, VIP+.

### Programming box RPB / RPB-E

This device can perform all operations such as manual robot operation, program entry and edit, teaching and parameter settings.

| | RPB | RPB-E |
|---|---|---|
| Model | KBK-M5110-10 | KBK-M5110-00 |
| Enable switch | – | 3-position |
| CE marking | Not supported | Applicable |

P.413

● Environment

| | |
|---|---|
| OS | Microsoft Windows 2000/XP/ Windows Vista Note The 64 bit version is not subject to the operation warranty. |
| CPU | Exceeding the environment recommended by the OS being used |
| Memory | Exceeding the environment recommended by the OS being used |
| Hard disk | Vacant capacity of more than 40MB in the installation destination drive |
| Communication method | RC232C, Ethernet Note. The Ethernet usable unit is required separately for the Ethemet communication. |
| Applicable controllers | RCX221 / RCX222 / RCX40 / RCX141 / RCX142 / RCX240 |

Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.
Note. Ethernet is the registered trademark of US XEROX Corp.

P.410

Support software for PC

# VIP+ Windows

Visual Integrated Programming

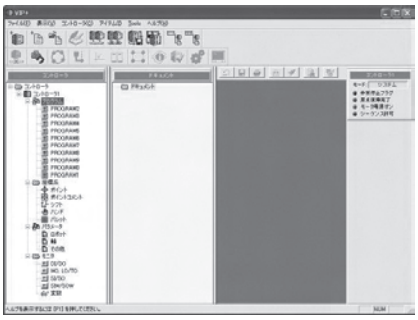
## Applicable controllers ▶ RCX221 RCX222 RCX141 RCX142 RCX240

VIP+ is an easy to operate application software that makes tasks such as robot operation, writing-editing programs, and point teaching easy to visually understand.

## Features New support software VIP with improved ease of use

### 1 GUI updated for enhanced usability

The user interface has been improved with the VIP Windows function kept as it is so as to achieve more ease of use.



### 2 Data displayed in the tree view form

The data included in the controller is displayed legibly.

### 3 Fully equipped tool bar

Each of various functions can be executed by simple one click on the tool bar.

### 4 Expanded monitor function

The I/O conditions and variables in the controller can be monitored at real time. In the advanced mode, it is also possible to attach any label (Note) to general purpose input/output and others.

Note. The label is stored in PC.

### 5 Data operation using the new drag & drop function

The data can be stored easily by using the drag & drop function. Likewise, the stored data can be restored to the controller by operating the mouse only.

Select the data to be stored.

Drag the selected data to the document window and drop it there.

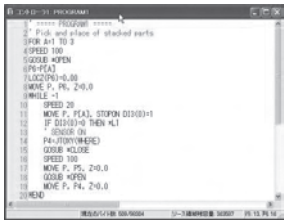
Specify the file name and this completes the storage procedure.

### 6 Input the data in the work sheet form (Parameter, Point data)

It is also possible to copy and paste the data from the other spread sheet (chart calculation software).

### 7 Syntax coloring when editing the program

When reserved words (character string reserved as the robot language) are inputted, they are colored automatically, making them noted at one glance for easier program editing.



### 8 Program execution monitor

The step being performed during the program execu ion can be monitored. Thus, it ispossible to check which step is performed without stopping he program, thereby debugging of the program is made much easier.

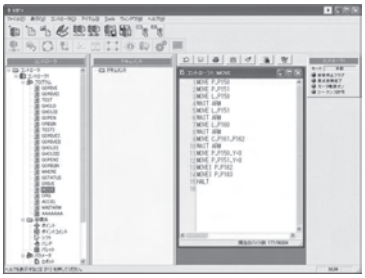
### 9 List appointing (point where the system is restored)

It is possible to create the system restoration point at any timing. By doing so at important points in the system constructing process when, for example, some hing faulty is found after the system was changed, the system can be returned to the state before such change easily.

## VIP PLUS function

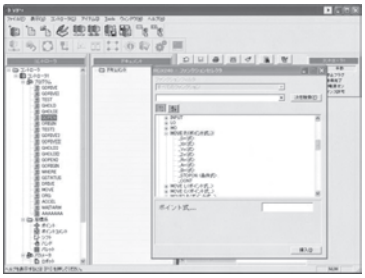
### 1 Easy to use

With a number of robot operation items provided on one screen, any operator can operate easily without memorizing the menu construction.



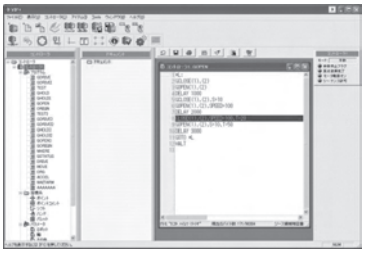
### 2 Programming editing

The program, point, parameter, shift, and hand can be edited on the PC alone. Equipped with the function selector having the command searching function which enables to input the robot language with ease.



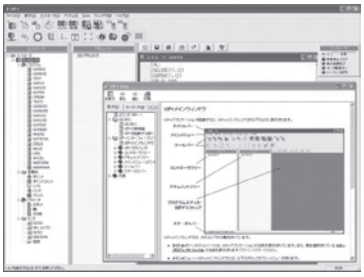
### 3 Data check function

Provided with the equivalent data check function to that of a robot controller, it is possible to correct data errors before operation.



### 4 Help function

When more information is needed during operation, press the [F1] or [HELP] key, and the help screen will appear.

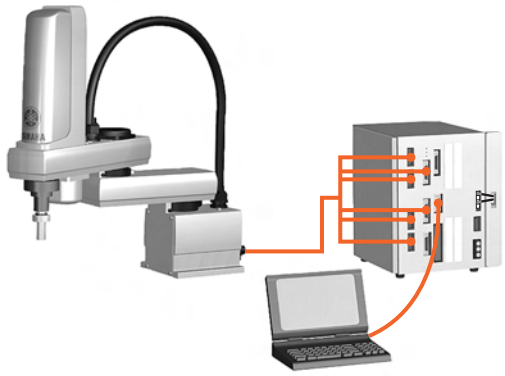


### 5 Robot operation

By connecting PC and controller with communication cable, robot operation will be available by he on-line command.

### 6 On-line editing

Connecting a PC and the controller with a communication cable enable to edit data from robot controllers just as with RPB / RPB-E.

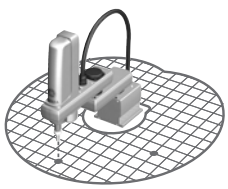


### 7 Creating point data

There are three methods available for creating the point data.

**MDI (Manual Data Input) teaching**

The numeric keyboard is used to enter position coordinate data directly.



**Remote teaching**

The robot arm is actually moved to the target position using the keys for point data registration.

**Direct teaching**

The robot arm is manually moved to the target position with the servo motors off for point data registration.

Environment / Ordering method ▶ P412

## Support software for PC VIP+

| Model | KX0-M4966-00 |
|---|---|

## Environment

| | |
|---|---|
| OS | Microsoft Windows 2000/XP/<br>Windows Vista Note The 64 bit version is not subject to the operation warranty. |
| CPU | Exceeding the environment recommended by the OS being used |
| Memory | Exceeding the environment recommended by the OS being used |
| Hard disk | Vacant capacity of more than 40MB in the installation destination drive |
| Communication method | RC232C, Ethernet<br>Note. The Ethernet usable unit is required separately for the Ethemet communication. |
| Applicable controllers | RCX221 / RCX222 / RCX40 / RCX141 / RCX142 / RCX240 |

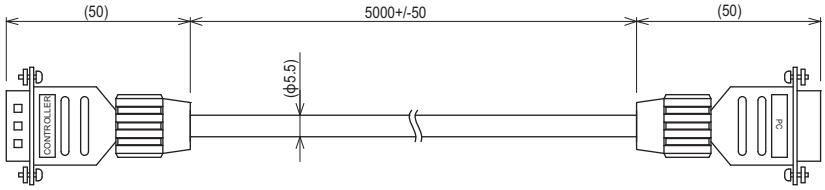
Note. Windows is the registered trademark of US Microsoft Corporation in U.S.A. and other countries.
Note. Ethernet is the registered trademark of US XEROX Corp.

## Data cables (5m)

Communication cable to connect PC and a controller.

| Data cable (9Pin-9Pin) 5m | KAS-M538F-10 |
|---|---|

Note. Data cable jointly used for POPCOM, VIP, VIP+.



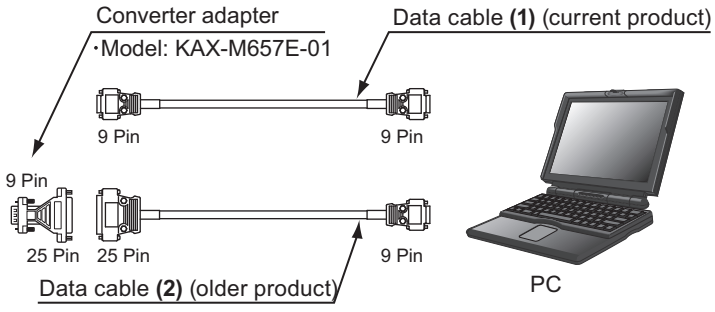

## Data cable / converter adapter matchup table

| Data cables \ Controller | ● **RCX221 / RCX222**<br>● **RCX40**<br>● **RCX141 / RCX142**<br>● **RCX240** |
|---|---|
| [9Pin-9Pin cable]<br>• KAS-M538F-10 (SSC-2-5L) | Needs no converter adapter |
| [9Pin-25Pin cable]<br>• KR7-M538F-10 (SSC-1-3L)<br>• KR7-M538F-30 (SSC-1-5L) | 25Pin-9Pin converter adapter<br>KAX-M657E-01 |

## Controller and data cable connection diagrams

**RCX221 / 222**
**RCX40**
**RCX141 / 142**
**RCX240**
(9 Pin)

Controller




| Data cables | | Length | Cable model |
|---|---|---|---|
| (1) | 9pin ⟷ 9pin | 5m | KAS-M538F-10 |
| (2) | 25pin ⟷ 9pin | 3m | KR7-M538F-10 |
| | 25pin ⟷ 9pin | 5m | KR7-M538F-30 |

Programming box

# RPB/RPB-E

## Applicable controllers ▶ RCX221 RCX222 RCX240

Customers using the RCX141 / RCX142 controllers should use the connector converter cable (See P427.)

All operations can be performed from this device including manual robot operation, programming entry and editing, teaching and setting parameters. The display works interactively with the operator so even an absolute beginner can easily learn how to use programming box.

## RPB / RPB-E basic specifications

| Name | RPB | RPB-E |
|---|---|---|
| External view | | |
| Applicable controllers | RCX221 / RCX222 / RCX240 | |
| Model | KBK-M5110-10 | KBK-M5110-00 |
| Display | LCD (40characters 8 lines) | |
| Emergency stop button | Normally closed contact point (with lock function) | |
| Enable switch | – | 3-position |
| CE marking | Not supported | Applicable |
| Operating temperature | 0°C to 40°C | |
| Operating humidity | 35% to 85%RH (non-condensing) | |
| Dimensions | W180 × H250 × D50mm (Strap holder, emergency stop button not included.) | |
| Weight | 600g | |
| Cable length | 5m (Standard), 12m (Options) | |

## Part names and function

**Display (screen)**
Liquid crystal display (LCD) shows different types of information with 8 lines × 40 characters. Contrast is adjustable.

**Sheet keys**
These are key switches for operating the robot or entering programs, etc. These are broadly grouped into 3 blocks consisting of function keys, control keys, and data keys.

**RPB connector**
This is a connector for connecting the RPB to the controller.

**Emergency stop button**
Pressing this button during robot operation sets the robot to emergency stop. These are B contact type switches.

## RPB-E Rear side

**3-position enable switch (only on RPB-E)**
This switch is usable as part of an external (remote) safety circuit.
Pressing this switch inwards or releasing it cuts off the (RPB/robot) circuit. However that circuit is operable when this switch is in middle position. This enable switch is usually operable in service mode. It functions as part of an external safety circuit so that releasing the enable switch or pressing it inwards set the robot to emergency stop.

Field network system with minimal wiring

# NETWORK

## Applicable controllers ▶ RCX221 RCX222 RCX240

## Network modules CC-Link

- Option unit with networking functions that can be incorporated in YAMAHA robot controllers, RCX221 / RCX222 / RCX240.
- As connection of the robot system and the sequencer requires only one (4-wire) dedicated cable, it is possible to save wiring of the entire system, which contributes to efficient wiring work, reduction of installation and maintenance costs, etc.
- 96 general use inputs/outputs, 16 dedicated inputs/outputs (4 nodes occupied).
- Capable of simulating serial operation of parallel I/O. With this function set properly, it is possible to control various I/O units connected to the parallel I/O of the robot controller, such as sensor and relay from the sequencer side without using the robot program, as if they are I/Os of the CC-Link system.

### Basic specifications for network modules CC-Link

| tem | Network modules CC-Link |
|---|---|
| Applicable controllers | RCX221 / RCX222 / RCX240 |
| Version supporting CC-Link | Ver. 1.10 |
| Remote station type | Remote device node |
| Number of occupied stations | Fixed to 4 stations |
| Station number setting | 1 to 61 (set from the Rotary swich on board) |
| Communication speed setting | 10Mbps, 5Mbps, 2.5Mbps, 625Kbps, 156Kbps (set from the Rotary swich on board) |
| No. of CC-Link I/O Note1 | General input 96 points, General output 96 points,<br>Dedicated input 16 points, Dedicated output16 points |
| Parallel external I/O Note2 | A function that simulates serial communication enables individual control of the various points from a master sequencer, regardless of the robot program. |
| Shortest distance between nodes Note3 | 0.2 m or more |
| Overall length Note3 | 100m/10Mbps, 150m/5Mbps, 200m/2 5Mbps, 600m/625Kbps, 1200m/156Kbps |
| Monitor LED | RUN, ERR, SD, RD |

Note 1. Controller I/Os are updated every 10ms.
Note 2. With RCX 141/142, the exclusive input of the parallel I/O cannot be used other than the interlock input.With RCX221 / 222, the exclusive input of the parallel I/O cannot be used. (The interlock input terminal is located on the SAFETY connector side.)
Note 3. These values apply when a cable that supports CC-Link Ver.1.10 is used.

## Network modules DeviceNet

- Option unit with networking functions that can be incorporated in YAMAHA robot controllers, RCX221 / RCX222 / RC240.
- As connection of the robot system and the sequencer requires only one (5-wire) dedicated cable, it is possible to reduce wiring of the entire system, which contr butes to efficient wiring work, reduction of installation and maintenance costs, etc.
- Capable of simulating serial operation of parallel I/O. With this function set properly, it is poss ble to control various I/O units connected to the parallel I/O of the robot controller, such as sensor and relay from the sequencer side without using the robot program, as if they are I/Os of the DeviceNet system.

### Basic specifications for network modules DeviceNet

| Item | | Network modules DeviceNet |
|---|---|---|
| Applicable controllers | | RCX221 / RCX222 / RCX240 |
| Applicable DeviceNet specifications | | Volume 1 Release2 0 / Volume 2 Release2.0 |
| Device Profile Name | | Generic Device (device number 0) |
| Number of occupied CH Note1 | | Normal: Input/output 24ch each, Compact: Input/output 2ch each |
| MAC ID setting | | 0 to 63 |
| Transmission speed setting | | 500Kbps, 250Kbps, 125Kbps (set using DIP switch on board) |
| DeviceNet I/O Note2 | Normal | General input 96 points, General output 96 points, Dedicated input 16 points, Dedicated output 16 points |
| | Compact | General input 16 points, General output 16 points, Dedicated input 16 points, Dedicated output 16 points |
| Parallel external I/O Note3 | | The master module and up to four ports can be controlled regardless of the robot program by using the pseudoserialization function. |
| Network length | Overall length Note | 100m/500Kbps, 250m/250Kbps, 500m/125Kbps |
| | Branch length / Overall branch length | 6m max./39m max., 6m max./78m max., 6m max./156m max. |
| Monitor LED | | MS (Module Status), NS (Network Status) |

Note1. Use the robot parameter to select Normal or Compact. However, with the controllers earlier than Ver.9.08 of RCX221 / 222, this selection is not available and the setting remains the same as Normal.
Note2. Controller I/Os are updated every 10ms.
Note3. With RCX221 / 222, the exclusive input of the parallel I/O cannot be used. (The interlock input terminal is located on the SAFETY connector side.)
Note4. These values apply when a thick cable is used. The distance is less when a fine cable is used or when thick and fine cables are mixed in use.

## Network modules Profibus

- Option unit used to connect a YAMAHA robot controllers RCX221 / RCX222 / RCX240 to Profibus.
- Optimum for high speed data communication and complicated communication processing.
- Communication is made available among devices of multiple number of manufacturers.
- Capable of simulating serial operation of parallel I/O. With this function set properly, it is poss ble to control various I/O units connected to the parallel I/O of the robot controller, such as sensor and relay from the sequencer side without using the robot program, as if they are I/Os of the Profibus system.

### Basic specifications for network modules Profibus

| Item | Network modules Profibus |
|---|---|
| Applicable controllers | RCX221 / RCX222 / RCX240 |
| Communication profile | Profibus-DP slave |
| Number of occupied nodes | 1 node |
| Setting of station address | 1 to 99 (set using Rotary switch on board) |
| Setting of communication speed | 9 6Kbps, 19.2Kbps, 93.75Kbps, 187.5Kbps, 500Kbps, 1.5Mbps, 3Mbps, 6Mbps, 12Mbps (automatic recognition) |
| Profibus I/O Note1 | General input 96 points, General output 96 points, Dedicated intput 16 points, Dedicated output 16 points |
| Parallel external I/O Note2 | The master module and up to four ports can be controlled regardless of the robot program by using the pseudoserialization function. |
| Overall length | 100m/3M 6M 12Mbps, 200m/1.5Mbps, 400m/500Kbps, 1000m/187.5Kbps, 1200m/9 6K 19.2K 93.75Kbps |
| Monitor LED | RUN, ERR, SD, RD, DATA-EX |

Note 1. The shortest I/O update interval of the controller is 10ms but the actual I/O update time varies depending on the update time with the master station.
Note 2. With RCX221 / 222, the exclusive input of the parallel I/O cannot be used. (The interlock input terminal is located on the SAFETY connector side.)

## Network modules Ethernet

- Option unit used to connect a YAMAHA robot controller to Ethernet, which can be incorporated in YAMAHA robot controllers, RCX221 / RCX222 / RCX240. Connection of this unit to the network operation by the TCP/IP protocol with a 10BASE-T cable makes data exchange with a robots easy.
- Capable of making an easy access from the TELNET terminal to the robot controller. As the command system is the same as that by the RS-232C communication, even first-time users can use it easily. (Windows PCs have a built-in TELNET terminal called TELNET.EXE as a standard equipment.)
- With a number of controllers connected in the network, it is possible to perform integrated information control over robots even at a distance from the work site.

### Basic specifications for network modules Ethernet

| Item | Network modules Ethernet |
|---|---|
| Applicable controllers | RCX221 / RCX222 / RCX240 |
| Network specification | As specified for Ethernet (IEEE802.3) |
| Connector specification | RJ-45 connector (8-pole modular connector) 1 port |
| Baud rate | 10Mbps (10BASE-T) |
| Communication mode | Half Duplex (Half-duplex) |
| Network protocol | Application layer: TELNET / Transport layer: TCP / IP<br>Network layer: IP, ICMP, ARP / Data link layer: CSMA/CD /<br>Physical layer: 10BASE-T |
| Number of simultaneous log inputs | 1 |
| Setting of IP address, etc. | Set from RPB |
| Monitor LED | Run, Collision, Link, Transmit, Receive |